

**The Role of Activity-Based Costing
in UK Universities**

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Abstract

The Role of Activity-Based Costing in UK Universities

The purpose of the research described in this thesis was to develop the concept of Activity-Based Costing (ABC) in the UK university context. The research methodology included sending a postal survey to 100 UK university institutions, augmenting this with a set of semi-structured interviews, as well as a statistical analysis of published data on university library operations.

The overall conclusion of this research was that ABC can be of value in a university, but that currently there is a failure to:

- employ established ABC practice,
- relate the ABC design to the purposes intended,
- identify costs related to customer-type (rather than product), and
- consider behavioural issues, in particular where authority has been devolved.

The key elements of the contribution to the knowledge and practice of ABC, in the UK university context, are the identification of

- The set of contextual factors that affect an ABC implementation,
- The purposes appropriate for this context, and
- The relevance of ABC to these purposes,

and the conclusion that:

Different purposes require different ABC systems, and in particular the choice of drivers for the costing of academic units is not appropriate for product design and cost management.

ABC analysis is justifiable even where expenditures are partly determined by factors other than the demands represented by activity/driver volumes.

Opportunity costing can be used consistently with the ABC ethos for university premises, academic staff and support services.

ABC requires adaptation in the light of anticipated consequences and behavioural effects, particularly to ensure goal congruence in the product/ service decisions made within semi-autonomous academic schools.

The emphasis/ use of ABC is likely to shift in line with the anticipated reduced role of direct academic labour and premises.

Implications for ABC in a wider context include the classification of purposes according to the use for allocations (eg. product decisions) and the philosophy guiding the choice of methods (eg. fairness v. truth). Implications also include the linkage to opportunity costing, and the circumstances requiring multiple ABC systems.

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Chapter 1 Introduction

The purpose of this research was to extend knowledge of Activity-Based Costing (ABC), and in particular its applicability in UK Universities. This introductory chapter is largely concerned with establishing the context within which UK universities are currently located, as relevant to cost allocation issues. Following this examination of the context, there is a statement of the objectives of the research, and an overview of the thesis.

1.1 The University Context

1.1.1 The Environment of Higher Education (HE)

Government Policy on Funding

Jarratt (1985) considered, through a set of efficiency studies, the financial/ administrative state of UK universities in relation to government policy changes and noted a number of difficulties. He noted that "universities are subject to influences of many types. Foremost are those which arise from sources of funding...", and cites changes starting with the 17% average funding cuts in 1981. While giving recommendations to government concerning its policies, in particular the need for longer-term planning of changes, Jarratt commended universities to seek "increased generation of income from non-government sources" and to "maximise the effective use of available resources". In terms of internal financial planning structures to achieve the latter, Jarratt includes the recommendation:

"Budget centres should be aware of the full cost of their activities including the overheads on which they call. Where over time the budget centre can affect the size of the overhead allocated to it, the cost of the overhead should be charged to it."

By the late 1980's, a number of government initiatives for both Further Education (FE) and HE had come to fruition, with a variety of publications giving advice regarding management and efficiency improvements in colleges, for example "Obtaining Better Value from Further Education" (Audit Commission 1985), "Managing Colleges Efficiently" (Department of Education and Science 1987), "Further Education Costing: Final Report" (Coopers and Lybrand 1987) (prepared for the Department of Education and Science) and "Managing Resources in Further Education" (Birch 1988).

Birch sought to encapsulate various sources of advice into a manual of guidance for managers in FE.

This manual contained a mix of theory (for example the relevance of different types of cost information to different management needs), and practical advice (for example, in terms of the design of information systems). It gave a clear picture (at that time and now) on the desired changes in attitude to costing in FE/HE, for example:

"If the environment is stable and resources and markets are secure - as in Further Education in the 1950's and '60s - then.... If, on the other hand, the environment is turbulent and resources and markets are at risk - as they are today in Further Education ..."
(This was in support of the recommendation to conduct strategic planning.)

For HE, some of the government's regulatory frameworks were non-financial (eg. the maintenance of teaching quality through inspections), but many frameworks and mechanisms sought to influence individual university policy by means of financial inducements or penalties. An example of this was the "partly incremental, partly bidding system" (Williams 1992) introduced by the government in 1989. The scheme that was devised allowed a university to recruit two groups of students: the first was a percentage of previous year's intake (95%), which would be fully funded, and the second was an optional group (5%), for which the university had to bid in terms of what payment it would require to educate these students, with payments differentiated between subject groupings. The intention was that inefficient institutions would be less able to compete for the second group, so over a period of years students would be reallocated to efficient institutions. It was also the expectation that this would result in pressures to improve efficiency in all institutions.

The resulting behaviour of institutions was not as forecast. Pratt and Hillier (1991) surveyed a large number of institutions as to how they had responded to the bidding process. Some had conducted cost studies, but most found the bidding process excessively complicated, and bids were often therefore submitted simply to maintain student numbers, if necessary below cost. The overall result was that the original aims of the scheme were not attained, and in the end this scheme was discontinued. Jones (1994) pointed out that a particular effect was that "it introduced the concept of fees differentiated by subject and, by implication, highlighted the need for sound costing systems in universities".

Sandbach (1993) described the funding changes (and the impact on universities) announced by the government in November 1992, which continued this philosophy of fee differentiation, coupled with new requirements for annual "efficiency gains of 3.1%". Sandbach also described the associated funding changes for research, where the majority of funding was now linked to the ratings awarded in Research Assessment Exercises (RAE), in particular where no funds were generally to be available for those with the lowest research rating. Sandbach concluded with:

"It is inevitable that every institution will be assessing whether it is a gainer or loser in the new higher education environment. To succeed in the funding stakes the perfect combination appears to be an ability to teach cheaply, to increase student intakes in the science and engineering areas, and to achieve a high research assessment score."

Changes in funding to a more transparent formula-based approach, with differentiation of programmes, had thus driven universities towards a greater concern with their costs.

It was clear that the overall pressure on funding had impacted many institutions. Williams (1992) reviewed this as a "turbulent decade" and Sandbach (1993) gave the example of Aston and London, for whom "potentially difficult decisions lie ahead". By 1996, more than a third of university institutions were reported to be running at a loss, with a forecast that "more than half of Britain's universities ... will be in debt by 2000" (Charter 1996), and with both Cambridge and Lancaster given as examples of institutions at risk, with the latter planning redundancies and cutting spending "to head off a predicted £5.8 million shortfall". Funding cuts based on required 'efficiency gains' and a 31% cut in capital grants (from the previous year) were considered to be the root cause of university financial difficulties.

Thus while a 'bottom-up' programme of re-education was driven by the formula basis of funding, for many universities this was reinforced with a considerable 'top-down' pressure from funding reductions, to maintain viability as an institution.

The Free-market Competitive Culture

The changes in government policy had also been a driver in developing an ethos of competitiveness. For example, Pratt and Hillier (1991) indicated that one consequence of the bidding process of 1989 was that colleges that had previously been willing to exchange information, had now strong competitive reasons not to do so, so that a cultural change took place whereby other colleges were no longer seen as participants in a common national educational goal, but now as commercial competitors in a limited market. In Pratt and Hillier's words 'confidentiality' replaced 'collegiality'. In a discussion of the changes impacting universities world-wide, Economist (1993) noted that of three strategies for change that were proving successful, "the first and broadest is to subject universities to quasi-market disciplines, an approach pioneered in Britain". (The other two strategies are the shifting of funding to lower-cost institutions, and the diversification of funding sources by universities.)

The increasing use of published league tables by government (and others) is evidence of this more

competitive environment, for example that produced by the Times newspaper (THES 1995). Even where the primary competitive impact was in terms of quality measures (eg. research output, and employment rates of graduates), rather than financial, the comparisons of course reinforced the ethos of competition.

Perhaps the greatest stimulus to competition in HE was the designation of a large number of Polytechnics at the beginning of the 1970's, and their subsequent expansion. Williams (1992) gave the proportion of full-time undergraduates in polytechnics as growing from 43% to 50% of the national total from 1979 to 1989, with a unit cost decreasing by 21% (real terms) over that period, compared to a decrease in university unit costs of 5%. The two main HE sectors (Universities and Polytechnics) were funded separately, had separate procedures for recruiting students, and in many other ways operated differently. Yet as the 1980's progressed, the two sectors increasingly converged in terms of formula based government funding mechanisms (Williams 1992). Operating in a common and competitive funding environment, and in what was increasingly seen as a common and competitive market for undergraduate teaching (if not at that stage research and postgraduate teaching), one might reasonably have expected to see increasingly competitive behaviour in the HE sector, particularly when, in the early 1990's, the two subdivisions came together in most respects, including the common name of 'university'.

There are now indeed signs of this behaviour. The Master of Business Administration (MBA) 'market' is an example of how the universities seem to have embraced this competitive spirit. Nearly all institutions now offer an MBA programme, and most see their potential catchment area as overlapping other institutions. Heriot-Watt University, as perhaps an extreme example, was reported in 1996 as aggressively marketing its distance learning MBA (started only in 1990) to 90 countries, with over 12000 students enrolled (Clare 1996).

So, just as the government chooses to influence individual institutions by direct actions in terms of funding, it perhaps has achieved equal impact by fostering the attitudes of free markets and competition. In universities, academic staff now have to consider cost and pricing issues that were previously the domain of administrative staff, and talk in the language of business about markets, products, and competitive advantage. Even by the mid-1980's, Jarratt (1985) had concluded that where the head of an academic department cannot combine management ability and academic leadership, then the priority had to be management ability.

An example of this increasing business orientation of HE in the UK was the formation in 1987 of the

educational charity 'Higher Education Information Services Trust' (HEIST), which actively promotes commercialisation of HE. For example the conference 'Marketing at faculty level' was advertised as follows (HEIST 1994):

"With devolved budgets and more decentralised management structures, many faculties ... are taking greater responsibility for marketing their courses and services ... This conference will consider both the strategic and practical issues of marketing at faculty level ..."

Perhaps indicative of the way things will develop in the UK is the already market-driven US private college sector. Bingham (1988) talked of "imagination in pricing strategy" and "creative pricing" as well as practicalities like the scheme offered by Calvin College in Grand Rapids, Michigan, involving the sale of "non-returnable gift certificates good for portions of future semesters". Bingham stressed that in this context, cost information is essential, and that "institutions should consider the development of direct costing systems so that they know how much individual programs, and even program components cost".

The Effect on University Attitudes to Revenues and Costs

One common effect of the various UK government schemes (whether directly through funding formulae, or indirectly through competitive pressure) was therefore to focus institutional attention on costs, and in particular the costs of educating students. One could presume that many institutions had not had to face this issue before, as once having reached a steady state, it would have been possible to proceed from year to year simply by maintaining and controlling overall budgets for revenues and expenditures. The new focus on costs, in particular unit costs for teaching, was reinforced also by the need to set economic fee levels for non-funded teaching (eg. MBA programmes, and expanded undergraduate provision for non-EU students) with full knowledge of costs. Williams (1992) pointed out that with the increase in the proportion of income that is 'earned', institutional financial management had shown "a marked shift during the 1980's from administrative allocation and regulation to a more varied system of financial management, involving incentives, levies, management information and cost analysis". One of the key tasks now was to "encourage subsidiary units to generate income from teaching and research".

In terms of revenue generation, universities have sought this in traditional ways through expansion of 'full cost' student numbers and through external research and consultancy contracts. However, they have evidently also become more financially imaginative and astute. An example of this is the use of the Business Expansion Schemes (BES) in the early 1990's. The government introduced the BES concept to stimulate the growth of small companies by allowing them to issue share capital to

subscribers, who then received relief from income tax on their investment. This attractive financial vehicle was exploited by a number of universities by selling student residences to newly formed companies, with an agreed buy-back after five years. By transferring ownership temporarily, and by taking advantage of the tax relief for investors, the university could make a profit (eg. Oxford Brookes University 1992). Other examples of revenue creation are tax-saving 'profit-related pay' schemes, the increased exploitation of premises for commercial activities, and the franchising of courses to lower-cost non-university colleges. Universities have also sought capital funding through commercial capital markets by issuing bonds. Lancaster University was the first to do this in raising £35 million in 1995, and similar funding was raised later by Greenwich and Westminster Universities (Targett 1997).

In terms of reducing cost, one would presume that this has meant both reductions in waste/inefficiency, and also reduced resourcing for courses and other programmes, and for central services. The primary cost for an institution is that of academic staff salaries, so the measuring and control of Staff-Student Ratio (SSR) has been important traditionally in addressing course costs, and has stimulated consideration of less labour intensive pedagogic approaches. However, SSR has weaknesses even for control of academic costs, and omits consideration of non-academic staffing, premises costs, etc. Simple measures like this provide no answers to the appropriateness of fee levels in covering overheads, or in the costing of new types of research programme. Similarly, if an institution might wish to release some resource (eg. premises space) for new revenue earning opportunities, then detailed cost information is needed to support pricing decisions. The consequence overall is a move from simple ratios and measures like SSR to a recommended approach to costing in universities that uses much of the sophistication of modern management accounting practice (eg. JFC 1997).

Pressures for Devolution of Funding and Costs within Institutions

One could conjecture that as the university sector moves closer to the private industrial and commercial sector, in terms of free markets and competition, so universities might increasingly be interested in the management methods and concepts proving successful in the private sector. There is particular evidence that this is so in the use of decentralisation and devolution of control to schools as 'business units'. Williams (1992) pointed out that "The post-Jarratt and post-corporate status orthodoxy is based on a belief that financial devolution to departmental cost centres will encourage awareness of opportunity costs used and provide incentives for income generation".

It could be argued that there has always been a tradition of devolving academic issues to Schools, but the debate has moved considerably in terms also of non-academic issues, for example giving schools the freedom to use (and pay for) central services as they wish, and the freedom to determine the balance of expenditure between academic staff and administrative staff. Williams pointed out that devolution is subject to criticism (for example relative to the lack of financial management skills at school level) and that there are differences in the way devolution is approached in different institutions. Bourn (1994) examined the way in which environmental changes (including funding) appear to have led to these changes in organisational structure. He argued that this does indeed lead to a process of devolution to schools, leading eventually to their having "extensive devolved resources and responsibilities". Thus he presented the differing models of devolution as stages on the way to this high level of devolution.

Tomkins and Mawditt (1994), at the University of Bath, gave some insight into how internal pressures then develop for cost information within this devolved structure with for example: "Some schools had felt that they were being held back from developments as 'their' surpluses were being used to prop up 'deficit' and, by implication, less successful schools". In Authers (1994), the rapid expansion at De Montfort University was said (by a pro-vice-chancellor) to have been partly facilitated by a devolved structure with "an approach to cost control that makes individual departments directly responsible for both costs and revenue". These cost centres were said to be "the first point where academic aspirations meet resource reality", with mechanisms that "made the cross-subsidies transparent, and forced academics to think in terms of cost-efficiency". So it would seem that the external pressures on universities have led to internal pressures for devolution, and these internal changes within institutions are then another factor in the increased attention being given to institutional cost structures, with issues like cross-subsidisation increasingly demanding figures to be disclosed.

Summary (The Environment of HE)

In summary, from the beginning of the 1980's, the pressures of competition, the reduction in government funding, the use of transparent and segmented funding mechanisms, and the internal pressures for devolution of finances have all led to increased attention to cost structures. They also have changed the university culture to increased consciousness of revenues and costs in all levels of staff.

1.1.2 Cost Information within the University

So attention has focused for various reasons on cost structures and methods within the institution. These cost structures and methods are now briefly examined, as well as the related needs for cost information.

Cost Structures

A university, in systems terms, can be viewed as a set of organisational components and activities, which processes a set of inputs (or resources) and produces a set of outputs or 'products'. Figure 1.1 outlines some key constituents of this system, most of which could be considered as 'cost objects', ie. as entities with which cost information can be associated.

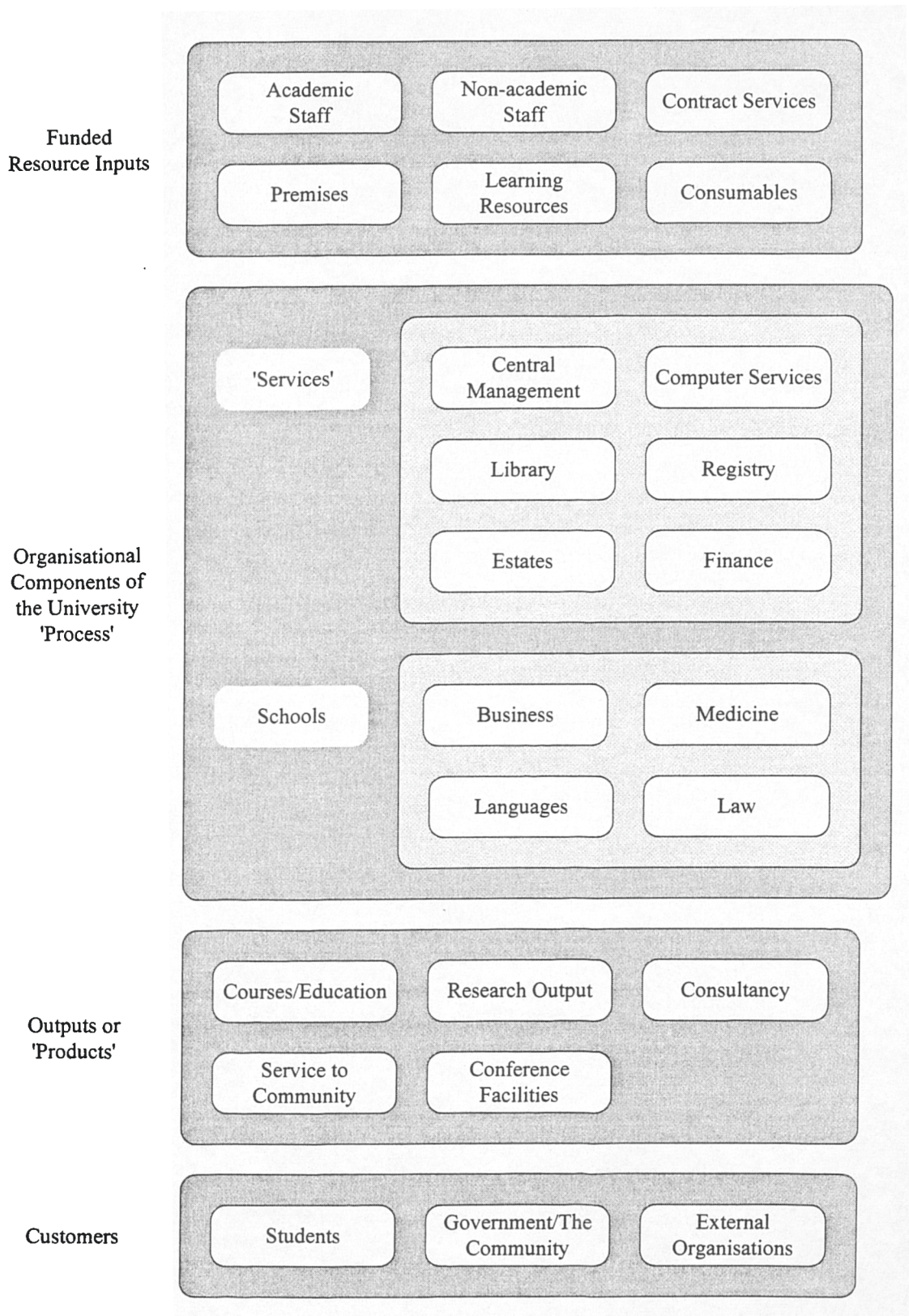
'Student' has been presented as a customer, to whom a product/ service (education) is delivered. The view could be taken that a student is a 'raw material' input to the process, and a 'graduate' is the processed output, but from a costing viewpoint the treatment of students as an input raises difficulties, in endeavouring to maximise outputs relative to inputs. For example, it would suggest maximising graduate numbers by avoiding teaching the first year of a degree, using entry with credit from elsewhere, even if the institution is better (and more cost-effective) at delivering this first year. Thus a service industry viewpoint has been preferred, that treats a student as a customer (rather than as raw material to be processed), with added educational value as the product/ service provided.

The limited set of objects that can be shown on the diagram is not comprehensive, for example it excludes specific identification of unsuccessful course applicants, or graduated alumni. Also each of the objects shown is a generalisation or summarisation of a potentially complex group of related objects, for example 'Premises' could represent a building, or an individual lecture theatre or a laboratory with unique cost patterns. The organisational components can also be subdivided into sections and teams, and even down to individual roles and functions, and courses can be subdivided by year, and by module/ subject. Similarly, cost objects can be aggregated into new objects, for example groups of courses and groups of departments.

All the same, the objects shown do represent a useful classification for the purpose of this discussion. This means that cost can be considered from several viewpoints:

Figure 1.1 A Systems View of Cost Objects

Note: the set of objects shown is illustrative and not intended to be comprehensive



1. The division of total expenditure by category of resource utilised, ie. the 'inputs' to the university.
2. The aggregation of expenditures on inputs according to the organisational component that directly uses the inputs, corresponding to the traditional budgets used by cost centre managers.
3. The aggregation of expenditures on inputs according to the organisational component which causes the need for the inputs, corresponding to the 'responsibility accounting' approach. In this viewpoint for example, Registry costs would include the usage of computer staffing and resources that are contained within the Computer Services budget.
4. The cost of delivery of the various outputs, and the origin of this cost within the organisation. For example, a course cost would include the cost of academic staffing contained in a school budget as well as the cost incurred by Registry in support of the course.

The first of these viewpoints is helpful at an overview level in determining initial priorities for efficiency improvement, by giving greatest focus to the largest components of total cost. Birch (1988) gave a typical structure of revenue expenditures (non-capital, and excluding debt charges) for an FE college:

	Percentage	
Employees - Teachers	64	
Employees - Others	15	
Premises	8	(Repair, Maintenance, Heating, Rates, etc.)
Supplies & Services	8	
Transport	1	
Establishment	1	(Telephone, advertising, printing, etc.)
Miscellaneous	3	
	100	

It is clear that academic staffing is the dominant expenditure, and justifies the customary use of Staff Student ratio (SSR) as a reasonable proxy for the ratio of output value to input cost.

Birch pointed out that capital and debt charges will depend on local land values, the age of buildings and equipment, the source of finance, and so on, so are best excluded from unit cost calculations used for comparison across colleges. Birch's comment is valid to a point, if the priority is to compare teaching and administrative efficiency, without the confusion of dealing with different capital values. However it is then difficult to trade off capital against revenue expenditure (eg. creation of self-learning materials to reduce future staff contact), and in HE, if not FE, it would seem increasingly important to make these judgements and trade-offs. Perhaps more significant is that HE operates in a national and international competitive context, where low premises rental, or efficient forms of financing, can give an institution a strategic advantage. Thus while it may continue to be

useful to compare specific revenue cost items across institutions, it would seem that for costing purposes there is a need to incorporate the costs of providing capital resources. JFC (1997) indeed recommended the inclusion of capital charges (depreciation) for buildings, and suggests a preference for current valuations in that the "historical costs of assets can give misleading information when determining a usage charge". However the report was equivocal in advising whether to use historic or current valuations with "HEI's will need to decide which basis is most appropriate".

HESA (1996) gave aggregate expenditure figures for UK HEI's showing staffing as still the dominant expenditure, but less so than was evident in the 1980's FE breakdown given by Birch. Some key components of the total expenditure were:

Academic staffing			
Academic departments	26%		
Research grants & contracts	6%		
Other	1%		
Total		33%	
Other staffing			
Academic departments	8%		
Research grants & contracts	2%		
Other	14%		
Total		24%	
Premises		10%	
Other expenditure			
Academic departments	9%		
Research grants & contracts	5%		
Other	19%		
Total		33%	
			100%

Depreciation cost, a large proportion of which was included in the premises figure, was 4% of the total, and interest payments were 1½% of the total.

Perhaps of particular interest is that although academic staffing is identifiable as the largest cost component, it only accounts for a third of total expenditure. In the FE scenario of the 1980's, teacher costs far outweighed the other staff costs. However in the HEI situation of the 1990's, these 'other' staff costs are of similar scale to academic staff costs. If the first cost 'viewpoint' is to direct attention to the major inputs used, then it is evident that non-teaching staff costs need such attention. However, while academic staffing can be (to some extent) treated homogeneously by measures such as SSR, there are no such simple measures for the heterogeneous nature of non-teaching staff activities.

The second of the cost viewpoints (aggregating inputs by organisational components that consume them) is relatively straightforward to measure and record, and various aspects of this viewpoint (as well as of the first) are presented in the published financial accounts of institutions. For example a typical breakdown in published accounts is as follows (aggregate figures from HESA (1996)), each of which measures the total inputs of staff and other expenditures:

Academic departments	43%
Academic services	6%
Administration & central services	12%
Premises	12%
Residences & catering operations	7%
Research grants & contracts	13%
Other expenditure	7%
	100%

This second viewpoint is perhaps the motivation for devolution of cost control. While the first viewpoint gave us the massive central challenge of analysing costs and establishing measures and controls, the second viewpoint suggests the alternative of splitting this large task into separate smaller tasks for each department or function, where there is the likely benefit that managers are more likely to understand the trade-offs between costs and benefits. This is of course conditional on there being financial and managerial skills at this level and that the needed analysis does take place.

The third and fourth cost viewpoints (assigning costs causally to departments and outputs) address this need for analysis, but are necessarily more complex, in that they involve a greater level of detail in the cost structures used but also because they involve relationships between cost objects, and the attribution or allocation of cost according to these relationships.

Relationships between Cost Objects

Three key classes of object emerge in terms of inter-relationships:

- Services (ie. non-academic departments), whose primary purpose is to administer or support teaching and research, rather than to perform these activities. It is assumed that ownership of capital assets and premises lies within one or more of these departments.
- Schools (ie. academic departments), whose primary purpose is teaching and research, and which contain the highest cost resource of all, the academic staff members.
- Products (in particular courses, and research programmes)

The relationship between services and schools partly parallels the relationship in manufacturing organisations between support services and production divisions. From the school's viewpoint, a service department provides some resource or service to an agreed level of performance. To obtain the third viewpoint (responsibility accounting) of institutional cost, there is a need for a basis for attribution of service costs according to the relationship with schools. Similarly there is also a need to clarify relationships involving inter-service provision of resources/ services and inter-school transactions (like service teaching).

In considering the fourth viewpoint (output costs), the key relationship is that between schools and products, in that the school is generally responsible for delivering the product to the customer, and incurs the primary cost of this delivery (academic staffing). However, services can also be associated directly with products (eg. library usage by courses), thus for evaluating costs of products, these relationships may also be useful. If the output cost is to reflect the organisational cost caused by the delivery of the product, then this implies a responsibility accounting approach, which therefore requires the same approach (the third viewpoint) to the assessment of those organisational costs.

JFC (1997) emphasised that the key to defining all these relationships is to focus on the activities that take place within the institution (for example activities like recruitment, registration, and assessment). Once these activities are defined, then various methods were proposed to relate costs accordingly. This implies considerable scope for complexity in determining the relationships between objects and in effect delineating the activities that take place in an institution.

A final point concerns income. The institution obtains its income for provision of outputs, so it might seem plausible to compare this income directly to product costs, and also to use the defined relationships to devolve this income back through the organisation. In practice, as noted previously, a substantial proportion of income is determined by government policy, and is subject to rapid and non-predictable change both in total amount and also in its formulaic assignment to specific products. Thus in the current funding environment the devolution of income could perhaps take some account of cost-object relationships, but starts from an imprecise base, compared with the relatively stable and predictable costs of inputs.

The Need for Cost Allocations

Note: Following a convention of many writers (eg. Horngren and Foster 1991), 'allocation' is used in this thesis as a broadly defined term to cover for example:

- identification of costs to specific categories or cost centres
- use of cost drivers (ie. allocation per unit), often referred to as 'apportionment', to assign costs of centres to other centres or to products
- assignment of notional costs (eg. opportunity costs, or over-recovery of costs) to cost objects.

Certain viewpoints on institutional cost can be obtained by straightforward financial accounting methods, with a form typified by departmental budgets and published financial accounts. However, JFC (1997) pointed out that for many purposes such cost information is not sufficient in itself. The following were identified as the main purposes of costing in a university:

"Strategic financial management

- to understand cost drivers
- to assist in allocation of funds
- to assist in the use of staff and other resources
- to support bids for external funding
- to provide measurements for business process improvements, benchmarking, etc.

Cost of teaching

- to assist in pricing courses
- to assess the economic viability of courses
- to determine the cost-effectiveness of different methods of teaching

Cost of research

- to allow comparison of costs with prices
- to assist in pricing decisions
- to support negotiation with funders
- to improve academic understanding of commercial pricing

Cost of other service facilities

- to improve cost management
- to assess profitability
- to assist in pricing decisions

Cost of support activities

- to identify efficiency gains
- to inform internal recharging
- to assist in outsourcing decisions
- to inform business process improvements
- to assist in pricing decisions"

JFC deduced that to achieve these purposes, some means of allocation of cost is required. JFC also made clear that in deciding the approach to allocation, it is important to be clear as to the purpose, in

that for example a costing exercise with specific purposes within a small support department may be more detailed than is needed for an institution-wide exercise to determine surpluses. It is not surprising therefore that some classification and simplification has to be made to produce workable costing methods. JFC gave guidance on how institutions should approach this, but was clear that, whatever the approach, allocations have to be made, and that a rational approach involving some form of activity analysis is needed to support these allocation methods. Activity-Based Costing (ABC) is presented as a useful tool in the allocation process

Summary (Cost information within the university)

Over the last two decades, there has thus been a substantial increase in the demand for cost information within universities, and a consequent demand for the use of cost allocations, and thence for activity analysis, and ABC.

1.2 Objectives of the Research

The literature (reviewed in chapter 2) indicates that cost allocation arises in all complex organisations, in particular to support decision making processes, but that traditional allocation methods have been shown to produce counter-productive consequences. Activity-Based Costing (ABC) has emerged in response to some of these problems, and has been shown to produce more productive consequences in some cases, in particular in industrial organisations with a wide and diverse product range.

Universities do have a diverse product range, so that it could reasonably be expected that ABC might be of value. As noted in the preceding section, funding pressures and commercialisation have led to a greater interest in cost allocation methods, with advice now given to universities in 'manuals of guidance' to consider in particular the use of ABC. However, while ABC methods have been successful in many non-educational contexts, there is so far little published evidence of its actual application in the university context. Belkaoui (1989) pointed out that factors like technology, organisation structure and the environment, lead to differing accounting systems in various situations, and the literature shows also that different purposes behind cost allocation lead to differing forms of allocation being appropriate. Thus it is by no means clear that the normative advice concerning ABC in universities is fully justified in what is perhaps a unique context and a

unique set of purposes.

Therefore, there are certain concerns with the university situation:

- There is little documented information on the actual use of ABC, or on its effectiveness, in this context.
- Guidance for universities is largely normative, based on experience in other contexts, rather than based on empirical evidence in the university context, and is limited in assuming particular purposes for the cost allocation.
- Guidance is incomplete in positioning ABC in this context relative to the purposes of allocation, and to the use of alternative methods.

The purpose of the research was to address these concerns, and add to the body of knowledge concerning ABC in the university context.

The specific objectives of the research were:

1. to develop the concept of ABC, in particular within the combination of context, structures and purposes found in UK universities.
2. to analyse and evaluate the relationship between ABC in this context, and other forms of costing and cost allocation.
3. to determine the implications for management accounting practice in UK universities, arising from this extended concept.

To achieve these objectives, a research design was constructed that utilised three forms of empirical data in an extended discussion and argument concerning the role of ABC, relative to costing issues in this context. This research process raised certain specific research questions, and the research design provided some answers to these questions.

1.3 Structure of the Thesis

Chapter 2 (Literature Review) reviews the published literature on costing issues, screening for relevance to the use of ABC in the HE context. This review is structured according to a categorisation of the literature, commencing with a review of traditional allocation methods, and some of the major debates that have taken place on the relevance of these methods. It then examines the origins of ABC, its growth in usage from manufacturing to service industries (including

consideration of what are said to be its limitations), concluding with the current state of ABC in HE. This review establishes the base of knowledge to which is added the research in this thesis.

Chapter 3 (Research Methodology) introduces the research design, and its rationale. The initial stage is the categorisation of issues that arose in the literature review into a set of overall 'themes', which form a reference framework for the collection and analysis of empirical data. The key stage in this process was a postal survey of UK universities as to current usage of ABC. This was followed by a small number of face-to-face interviews to verify some survey findings, and to obtain explanation for certain types of response. A separate part of the methodology was to use statistical analysis on a set of published university library cost data, which provided triangulation on certain of the survey findings.

Chapter 4 (Presentation and Analysis of Research Data) details the results of the analysis of the three sets of empirical data: (a) from the survey of UK universities, (b) from the set of interviews following the survey, and (c) from published data on university library costs.

Chapter 5 (Thematic Analysis of Issues) extends the analysis considerably, and is sequenced according to the set of themes arising from the literature review. For each theme there is a brief summary of the findings from the empirical data, followed by detailed discussion and argument, that both utilises the empirical results, and also translates to the university context, the theoretical and practical evidence from other contexts. For each theme, the argument leads to the development of a position regarding the applicability of ABC in the university context, consistent with the positions taken in the other themes.

Chapter 6 (Conclusions and Implications) reviews the findings of the previous chapter, to identify what this research has added to the body of knowledge as defined by the literature review. This is summarised as to specific issues for ABC in the UK HE context, and the wider issues it raises for ABC methods in other contexts. A final section identifies areas arising from this research, where there may be opportunities for further research.

Chapter 2 Literature Review

2.1 The Approach to the Literature Review

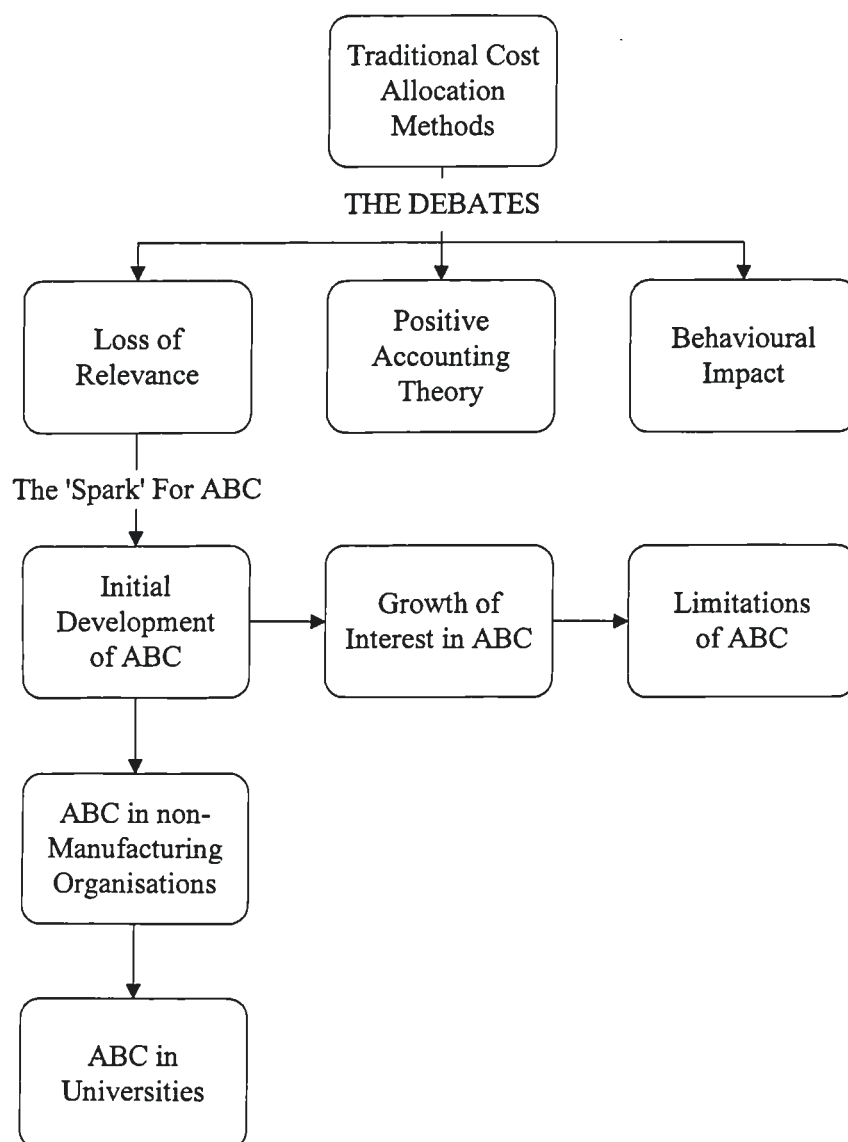
The objective of the literature review was to establish the current state of knowledge relating to ABC in HE, so as to provide a base on which to add further empirical information and analysis, and also to provide a framework in which empirical data collection and analysis could be designed. For such a framework, it was considered important to establish a categorisation of issues within which the research questions could be positioned.

The ideal starting point for the literature review (and indeed the research as a whole) would have been a pre-established set of categories and issues. The literature review could then be conducted within this framework, gathering related information from multiple sources. However, no clear framework of categories and issues was evident, and it was considered unsafe to make an assumption on the basis of relatively little published material on ABC in HE. Ryan *et al.* (1992) made clear that some form of structuring of the approach to literature review is important in minimising the 'inductive' bias possible from an unstructured sampling of the literature. One approach to structuring is to identify key publications and the development of the literature from them; this proved useful in developing the review of the ABC literature. However, given the sparseness of publication on ABC in the HE context, it was considered to be important to widen the review to other parts of the costing literature, so as to be more certain of fully identifying issues that in the end could impact the use of ABC in universities.

The challenge was therefore to consider a broad range of literature, so as to build up not only the base of knowledge but also to develop from this information the framework that was needed for the empirical work and the subsequent analysis. The approach chosen was as follows:

1. The broad areas of literature were identified as shown in figure 2.1. The choice of these areas was made largely by working back historically from the literature relating to ABC in universities, then back to non-manufacturing organisations, and then finally back to the initial use of ABC in manufacturing organisations. For ABC in general, a convenient categorisation was the literature giving the origins of the concept, and then the literature that covered the expansion of the concept and also the limitations said to arise from its use. The initial development of ABC can be traced back to literature covering the loss of relevance (of cost information) some aspects of which can be seen in earlier costing literature. Consideration of the 'relevance' issue led to identification of

Figure 2.1 Categorisation of the Literature



two related debates in the literature concerning positive (v. normative) accounting, and behavioural issues, most recently a feature of literature on Japanese costing methods.

2. The categories of literature were reviewed broadly in the sequence shown in the diagram, and in approximately historical sequence within each category.
3. During this review, the intention was to capture issues that appeared to be relevant to ABC in HE, therefore throughout the literature review, issues were identified as they arose in the text. There were of course preconceptions about which issues might be relevant (for example the influence of environmental context) but as far as possible an open attitude was adopted as to further issues. Within the text, these issues are identified by the paragraph heading: *Costing Issue:.....*
4. At the end of the review process, a large number of such issues had been identified. An iterative process of refining and categorising these issues was carried out, described in the final section of the chapter. The result of this was a smaller, consolidated, set of issues and a categorisation into 'themes' which formed the framework for the remainder of the research. (The titles used for issues in this chapter are those resulting from this consolidation process.)

The following sections of this chapter are each concerned with one of the literature categories examined, and the final section develops the framework of themes and issues.

2.2 Traditional Cost Allocation Methods

Johnson and Kaplan (1987) documented the historical development of costing methods, and in particular approaches to cost allocation. At the beginning of the 1980's, as a result of this historical development, there were relatively standardised cost allocation approaches in use (at least in the UK and USA), which in this thesis, are called the 'traditional' cost allocation methods.

Kaplan (1988) pointed out that cost allocation methods should be chosen according to the purpose for which the allocated costs are required, and that this leads inevitably to the need for different costing systems. One such key purpose, and the traditional method of allocation of costs for this purpose, are reviewed as a basis for exploration of costing issues in the literature.

2.2.1 Example of traditional product costing

Costing Issue: Costing for decision making

If a manufacturer of, for example, handmade wooden furniture wishes to operate profitably, then it would expect to sell its products for more than they cost to produce, and thus there is a need to know product costs. For this type of manufacturing process, total costs are dominated by the direct costs of labour, which can be readily measured in terms of labour hours per item. The manufacturer is left with the relatively small problem of how to deal with the (indirect) costs of the factory (rentals, heating, etc.) and of indirect labour (managers, designers, etc.). Whatever allocation methods are used will make little difference to the total product cost, so it is rational to keep the methods simple. Simple methods also facilitate the valuation of stock needed for end-year financial reporting. Standard accounting texts, for example Horngren (1977), show that the usual choice of method in this situation is to aggregate all indirect costs, and allocate to products on the basis of labour hours (or perhaps on the basis of direct costs of labour and materials). Costing a product is then as simple as adding a fixed percentage to labour costs, or to total direct costs.

A slightly more complex situation arises if the manufacturer automates the manufacturing process, increasing the costs of the factory (and its machines), and decreasing the cost of direct labour. If allocation on the basis of labour hours puts an undesirably large loading on products with low levels of automation, then it is common to add sophistication to the method, in that total indirect costs are split into two pools, one of which is allocated on the basis of labour hours, and the other on the basis of machine hours. The ultimate development of such methods involves a set of pools, with a separate allocation base for each.

Horngren (1977) gave us a useful view of standard management accounting practice at the end of the 1970's. In covering cost allocation, he illustrated many variations on the above theme, for example the problem of allocating costs from service departments where these provide reciprocal services. Interestingly, in the context of this thesis, some of the allocation bases he referred to are linked to activity levels in the service departments, for example number of hires, number of computer reports, and number of purchase orders. Horngren was not the first to use activity levels as an allocation base; an activity-based measure was considered by him to be simply one of many valid bases, dependent on the situation.

However sophisticated these allocation methods might be, in explanatory examples they almost universally focused on these situations:

- A product range consisting of relatively few products with similar characteristics, in particular with similar output volumes
- Manufacturing environment, with costs dominated by direct labour and machine usage, and thus driven largely by output volumes

2.2.2 Some complexities

Costing Issue: Fixed, marginal and average cost

Horngren explored the problem of decision making, and as to which costs are 'relevant' to particular decisions, for example in setting prices. One key area of complexity in cost allocation is whether to use fully-absorbed average costs or marginal costs. If a manufacturer has unused capacity, and a one-off opportunity arises to exploit this capacity, the suggestion is to consider a marginal costing approach, rather than the average costing approach above (where all costs were divided by the allocation base to arrive at an overhead cost per unit). The argument for marginal cost is that most indirect costs (like factory rental) are incurred regardless of whether the additional short-term opportunity is taken, and therefore should not be involved in the decision. The argument is therefore that there should be simply a comparison of the increment in revenues with the increment in costs, the latter comprising direct costs (materials, etc.) and that part of indirect costs which is variable (overtime payment for supervisors, etc.).

Horngren made clear that the concept of 'fixed' cost is however dependent on the length of the time period involved, so in turn this affects the definition of marginal cost. It may be helpful to separate out the long-term versus short-term dimension, from the average versus marginal cost dimension, in this discussion. The figure illustrates this:

Average cost	Pricing where no existing activity base	Long-term product costing
Marginal cost	Pricing of short-term spare capacity	Pricing of long-term spare capacity
	Short - term	Long - term

In the figure, the previous examples are placed in the top right and bottom left quadrants. For completeness, a scenario for the bottom right quadrant would be opportunistic pricing of spare capacity on a long-term basis. The difference between this and its short-term counterpart is the definition of marginal cost, in that many costs seen as fixed in the short term would be variable in the

long-term. For example while overtime working may be acceptable on one-off occasions, it may not be acceptable as a long-term continuous feature, so that an increase in the underlying 'fixed' workforce may be needed, with perhaps revisions in shift patterns and working week patterns.

At the top left quadrant, a scenario might be short-term costing in a contract-driven organisation, where every job is individually negotiated and there are no set prices. If each job is treated as a one-off decision opportunity, marginally costed, then in the end there is no assurance that the contribution to profits will cover indirect costs, so management may well prefer to use an average cost approach with full absorption of costs. The contrast in the bottom left quadrant is that there is already an assured level of activity covering the indirect costs.

In allocating costs, a number of other complexities arise that make the overall process necessarily empirical rather than, in the mathematical sense, provably correct.

Costing Issue: Joint costs

Joint costs (Horngren 1977) occur for example in the scenario above when the factory is shared by two divisions, and it is required to determine what proportion of the factory rental is allocated to each division, or to their respective product lines. Similar situations arise for example in the shared use of computer facilities or in common benefit from central service functions like Public Relations. While methods can be established, they are often an arbitrary or negotiated choice from a variety of possible approaches. Indeed, Thomas (1982) demonstrated that attempts to provide theoretical rationale for joint cost allocations had been inconsistent, particularly where the rationale was based on behavioural impact on those receiving the allocations.

Costing Issue: Capital employed

Where capital expenditure (say on a computer system) provides value over many time periods, there is another cost complexity. Sizer (1979) made the point about the complexity of this issue:

"In economic terms depreciation is the cost of recovering the capitalised value through production,....and such recovery must take into account changing technology, rising price levels, etc. if *real* capital of the business is to be preserved....depreciation is one of the costs associated with a marginal increment of output and is a true part of marginal cost. However, in practice it will scarcely ever be thought of in these terms..."

In reality, the selection of a depreciation method appears to be a subjective choice, perhaps linked to taxation allowances or to anticipated risks of obsolescence, but in any case rarely deals with issues like the increasing cost of asset replacement (Sizer), or indeed with the loan interest (or loss of investment interest) incurred. Even more problematical is where the expenditure buys an asset (like

buildings) that holds its value, or (like land) increases in value. Logically, if declining value is dealt with by charging a depreciation cost, then perhaps nothing should be charged for use of the constant-value asset, and an appreciation credit should be applied for assets that increase in value.

Costing Issue: Opportunity costing

A final example of an added complexity is opportunity costing. Sizer stated that "opportunity cost is an important concept, and one that is increasingly used by the management accountant". While one might accept the first part of this statement (from a theoretical perspective) there is not ample evidence for the second part. Horngren for example made little of the concept, other than in a discussion on transfer pricing. A typical scenario to illustrate the concept might be that the factory is owned (rather than rented), and long ago has been written down in the company's accounts to a low value. The economist would argue that if the factory has a real higher value (eg. it can be rented out to another company, or it can be utilised to expand another part of the company's operations), then products should bear the opportunity cost of the resources that are being utilised rather than an accounting figure that is simply a consequence of prior-year financial reporting. Opportunity costing of land and buildings avoids the complexities of dealing with depreciation and appreciation of assets, but faces the financial accountant with the problem of charging a notional cost (eg. market rent of premises) rather than allocating a figure already in the company accounts. This added complexity, while perhaps useful for managerial purposes, achieves nothing in terms of statutory financial reporting and is therefore perhaps resisted.

Staubus (1971) foreshadowed Activity-Based Costing by his detailed treatment of (manufacturing) organisations as a collection of interdependent activities, each of which has inputs and outputs. In assessing the cost of inputs, Staubus strongly advocated the use of opportunity costing of resources, and developed this to include for example:

- the use of future acquisition cost rather than past acquisition cost
- the cost of equity capital, relative to its alternative uses
- periodic charges for assets that include a cost of capital
- variable rate costing where supply of a resource fluctuates between surplus and scarcity (whether on a weekly or seasonal pattern)

Finally the last point was extended to the example of a sales clerk who is paid a constant monthly salary, yet with an understanding that greater workload is expected at certain times of the year. The implication is that the charge to the activity should be differentiated, even though the organisation's incurred cost remains constant.

2.2.3 The situation at the beginning of the 1980's

In summary, at the beginning of the 1980's there was an established set of cost allocation methods, partly theoretically-based, and partly the result of standard practice and tradition. Most of these methods were computed with high precision, yet the selection of particular methods was often (of necessity) judgmental. Although many of the methods had their origins in manufacturing, there was coverage also of service organisations and public sector organisations. What had driven the development of this costing framework had been a mix of management needs and financial reporting needs. Some particular complexities that required adaptation of the traditional methods of overhead allocation were:

- Increased automation in manufacturing meant that an allocation based on labour hours was not sufficient on its own, and needed supplementing with machine hours and other bases.
- Allocation of service departments costs could be better linked to service activity levels rather than factory output volumes.
- Allocation of service department costs was problematic where reciprocal services were provided.
- 'Relevant' or marginal decision making suggested the omission of fixed costs from the calculation.
- The definition of 'fixed' cost had to be related to the time-scales involved.
- The allocation of joint costs involved arbitrariness.
- The multi-period allocation of capital expenditure involved arbitrariness.
- Opportunity costs should be used where practicable, and are particularly relevant to premises costs, and to the use of resources fluctuating between surplus and capacity.

Some of the debates are now examined, that have arisen concerning 'traditional' methods.

2.3 The Debates

Given the process of historical development, the traditional cost allocation methods discussed in the previous section were presumably adequate for many purposes in many organisations. However, a number of debates have taken place relative to these methods. While some of these debates have early beginnings, the level of debate intensified considerably in the 1980's.

2.3.1 Debate 1: the loss of relevance

Kaplan (1983), (1984), (1985), Cooper and Kaplan (1987) and Johnson and Kaplan (J&K)(1987) examined certain weaknesses in the cost information produced by traditional methods. J&K described the historical development of management accounting (in the USA) in the 19th century in textile companies (using input/output efficiency measures), steel companies (using systems to accumulate and monitor product costs), railways (costing per ton-mile), and mass retailing (stock turnover ratios). J&K's view was that the thrust of these developments was to improve efficiency and decision making, with lesser focus either on profit itself, or on the efficiency with which capital was utilised, and that these organisations were successful and profitable as a result.

Costing Issue: The influence of context

J&K then explored how the development of large diversified corporations like Dupont and General Motors created a need for new accounting systems, in particular to ensure the most efficient application of cash flow through many divisions of the organisation, leading to significant use of Return on Investment (ROI), as well as to innovations like flexible budgeting (allowing for variations in volumes). The growth of public ownership of corporations also created a need for consistent and auditable external financial reporting to stockholders, and to other providers of funds.

Costing Issue: External financial reporting

In terms of management accounting, J&K argued that by about 1925 most current (ie. in 1987) methods were already in existence, and from that date there was little innovation, as financial accounting came to dominate, with top management increasingly "managing by the numbers" rather than maintain focus on the underlying processes and efficiencies.

In parallel with changes in emphasis triggered by the organisational context, the role of the accountant became primarily focused on the financial reporting and auditing aspects, so that cost accounting became a tool for inventory valuation and financial reporting rather than for management tasks like setting a rational pricing policy. J&K state that even from the 1920's there were expressions of concern and advice about the need for a separation of management accounting cost systems (from financial reporting systems), but that these seem to have been rarely heeded, with the only notable exception being the enthusiasm with which Discounted Cash Flow methods were greeted in the 1950's.

Costing Issues: Costing for decision making

J&K considered that a major weakness was that costs were often being allocated to product on the basis of labour hours, even though typically the allocated costs might be significantly larger than these labour costs. This led to an over-emphasis on labour hours, leading for example to unnecessary use of (non-burdened) subcontracting. It also led to increases in product ranges where direct labour content was low, even though these might be causing additional indirect workload (eg. in quality assurance). The consequence of this was that burden rates per labour hour steadily increased to the point where competitors were thus apparently able to sell products at a price below the cost of production, leading to decisions to drop products whose perceived lack of profitability was actually a consequence of these erroneous allocation methods. In effect, cross-subsidisation was commonly taking place, from high volume low-overhead usage products to low-volume high-overhead usage products, none of which was recognised in the volume-related allocation processes. Jonez and Wright (1987) reported an example at Tektronix, Inc. that seems typical of such scenarios. Overheads were allocated onto labour costs, yet these had decreased to about 7% of total costs, and for some products were as low as 3%. Faced with rising overheads, product managers were incorrectly seeking the solution in terms of reducing labour hours.

Costing Issue: Fixed, marginal and average cost

J&K argued that the issue becomes serious as the scale of indirect costs rises, but inaction is exacerbated by traditional notions of fixed and variable cost, linked only to output volumes:

"The failure to recognise the long-term nature of most product-related decisions has prevented cost accounting students, teachers and practitioners from understanding the causes of the rapid growth in the so-called 'fixed costs' of the firm." ... "That many of the most significant product costs are called fixed or sunk signifies the poverty of current cost accounting thinking. All costs are the consequences of managerial decisions at some time." ... "The goal of a good product cost system should be to make more obvious, more transparent, how costs currently considered to be fixed or sunk actually do vary with decisions made about product output, product mix, and product diversity."

J&K recommended new costing systems that deal more appropriately with the increasingly common situations of a diverse product line (in terms of output volumes and product characteristics) where indirect costs represent a significant proportion of total costs.

Costing Issues: Currency of information; Selection of cost objects; Setting goals; Capital employed; Complements to unit costing

In emphasising these activity-based approaches, J&K also pointed out some other problems leading to inappropriate management information that need attention in the cost analysis:

- Financial reporting processes give information which is often out-of-date, presenting current or

historic data for projection of future costs, and which also is too aggregated for decision purposes.

- There is often an overemphasis on short-term financial performance goals at the expense of consideration of long-term benefits. In particular, this overemphasis deters expenditure on training, research, promotion, etc., which provide long-term benefit (like a capital asset), and yet are routinely expensed against the current period.

As an extension of the latter point, the French 'Tableau de Bord' (or 'dashboard') and the 'Balanced Scorecard' (Kaplan and Norton 1997) represent strategic-level approaches to maintaining focus on the measures (often non-financial) which are expected to determine long-term profitability.

2.3.2 Debate 2: Positive Accounting Theory

Costing Issue: Acceptance v. applicability

Watts and Zimmerman (W&Z) (1978) and (1979) sparked off a long-running debate over an area which they termed 'Positive Accounting'. The justification for their approach was that existing accounting theory took a wholly normative approach, and failed to recognise that if real-world, supposedly rational, decision-makers were doing otherwise, the theory may be wrong. As an adjunct to normative theory, the 'positive' approach would be to observe what accounting practices are in real use, then to find explanations for this usage. In turn this might provide insights to improve normative theory.

Costing Issue: Fixed, marginal and average cost

Zimmerman (1979) examined specifically the rationale for cost allocations. This quoted Horngren (1977), and Kaplan (1977), as two writers who "believe that cost allocations are linked to managerial behaviour". The object of Zimmerman's paper was to demonstrate that there is a valid rationale for the common practice of average-cost charging, in particular in proxying the costs of degraded service when there is increased sharing of a fixed resource.

Costing Issue: Opportunity costing

Zimmerman considered the situation of a central service which increases its cost step-wise (eg. hiring an extra person when demand is sufficient), and where apparently between steps there is no marginal cost associated with additional demand. It is argued that in this situation, the extra demand causes additional hidden costs in the other recipients of service, because of queuing and delays (which Zimmerman called "incremental crowding externalities"); thus an average-cost calculation, by smoothing the cost-steps, in fact is more representative of the overall organisational marginal cost,

ie. including the opportunity cost of the degraded service. This is a meaningful argument for any use of average costing, and in particular for Activity-Based Costing (ABC), in that ABC calculations are essentially long-run average cost. This has all made assumptions about the behaviour of organisations, in particular that organisations do not take on additional central resource unless it is to be fully utilised, that the opportunity cost of degraded service just prior to an increase in central resource matches it in cost, and that the organisation is sufficiently intelligent to approve a step-increase in central resource when the hidden costs reach a level to match. Even so, in the absence of information on all this, it seems a not unreasonable assumption that:

- the real organisational cost of a central resource does comprise both direct costs and hidden opportunity costs of degraded service, and
- average cost at a step-point is a useful measure to proxy for the incremental hidden costs between step-points, in the absence of any better measure.

Returning to the general theme of Positive Accounting (PA), it would appear that W&Z (1978 and 1979) started a useful debate, and that the example of proxying for hidden costs of degraded service in Zimmerman is an important illustration of the approach, ie. first observe current practice, then seek an explanation, and then suggest improvements in the normative theory.

In the 1980's a number of papers (pro and con) in the area of PA ensued. Watts and Zimmerman (1986) had by now moved on to state that "The objective of accounting theory is to explain and predict accounting practice." This took their position away from a supportive role (to normative theory) to an extreme position, which left no role for normative theory. Unfortunately this also invited opponents to adopt equally extreme positions, opposed to the 'positive' approach.

Watts and Zimmerman (1990) reviewed from a ten-year perspective the accomplishments of the theory, and the criticisms made of it. They suggested that real benefits have arisen in that because of PA-driven research, some new empirical irregularities have been discovered (eg. a correlation between the use of income-minimising accounting practices, and the size of companies). While this may be so, the results of the investigations into cause-effect relationship appear inconclusive, generally based on regression models with a low quality of measurement of variables (eg. the existence of management bonus plans represented simply as a zero-one variable), and on a large number of assumptions. In fact the PA proponents (including W&Z) seem to have narrowed the focus of PA onto a few specific areas, and in general have taken a rather different approach than that conceived earlier, as driven by observation. W&Z's approach seems often to have become:

1. speculate on what rationality and utility maximisation might cause in terms of manager behaviour, then
2. assess what this might do to the organisation in terms of measurable or identifiable characteristics, and finally
3. determine by observation whether the characteristics do indeed occur as predicted.

This (as with any) approach can be justified as worthwhile if it does reveal unsuspected empirical irregularities, but it proves nothing in terms of the cause of the irregularities, as it is possible that an entirely different set of assumptions could lead to the same irregularities. It seems unfortunate that the PA debate then is largely side-tracked into discussion of these individual cases, with both the pro-lobby (led by W&Z), and the anti-lobby gambling the whole of the PA approach against the validity of these cases.

Sterling (1990) for example reviewed W&Z (1986), using phrases like "I assess PA theory's addition to knowledge to be nil". Sterling rightly points out some weaknesses with reported PA activities (eg. the assumption that people are utility maximisers), but this is overshadowed by the bias in his overall critique, for example making generalisations beyond W&Z's statements and then asserting that the latter are invalid by 'proving' that the generalisations are invalid. The arguments were generally based on inappropriate parallels (eg. surgery practice).

Costing Issues: Acceptance v. applicability; Fixed, marginal and average cost

Boland and Gordon (1992) gathered together this debate, with: "We will show that Watts and Zimmerman were partially correct. Almost all the critiques are inadequate or mistaken, and the few remaining critiques that are adequate and logically sound have been ignored in the 1990 response of Watts and Zimmerman." Where this leaves the ongoing debate in general is hard to say, but, returning to the objectives of this thesis, the positive accounting approach (as originally defined as an adjunct to normative methods) does have value in raising these aspects in the context of Activity-Based Costing (ABC) and of university costing:

1. ABC has experienced a wave of popularity in the late 1980's and early 1990's. Is this popularity an indication that whatever its theoretical strengths and weaknesses, the method is probably on balance advantageous?
2. The common practical use of average costing for decision making (rather than marginal costing) may have theoretical validity as a proxy for the opportunity costs of degraded service. (ABC as practised is an average costing approach).
3. If universities fail to use certain costing methods, like ABC, then rather than assume that universities are at fault, one should keep an open mind as to whether this is an indication that the

methods are in fact inappropriate, in this context.

2.3.3 Debate 3: Behavioural Impact

Costing Issue: Costing to influence behaviour

Anthony (1957) examined the effectiveness of costing methods for control purposes, in an endeavour to provide recommendations as to which methods were in some sense 'best'. His findings, shared by other members of a committee of the American Accounting Association, was that empirical evidence did not support that approach, because of the differing results achieved in practice by each method. Their conclusion was: "We are convinced ... that approaching the control problem in terms of human motivation ... is much more fruitful than an attempt to define 'true' costs ...". One of Anthony's examples is that of charging for university reprographics services, concluding that "... the decision as to what type of cost should be used is arrived at, not by trying to find the true, objective cost of duplicating ... but rather by using cost constructions that are calculated to motivate the department head to act as the administration wishes him to act".

Caplan (1966) considered how organisations function, and how this then reflected on management accounting, for example recognising that "the objectivity of the management accounting process is largely a myth. Accountants have wide areas of discretion in the selection, processing, and reporting of data." Subsequently, Caplan (1968) suggested that "the principal objective of management accounting is the influencing of behaviour", and so "the management accountant must function with some view of behaviour in mind".

Horngren (1977) examined aspects of how accounting systems should be designed and selected in relation to their behavioural impact on decision makers. An opening remark sets the scene:

"...the behavioural problems raised now are absolutely central to cost or management accounting. The choice of a particular system is not made in the abstract. Sooner or later, behavioural problems must be identified and confronted, although there are no pat answers or even a systematic method for solving the problems."

Costing Issue: Setting goals

Horngren commenced the examination of behavioural issues with a consideration of goal-congruence, stating that "Whether the top-management objectives are achieved usually depends on whether individual and group objectives within the organisation harmonise with those of the organisation as a whole". He points out that a common instance of misplaced sub-goals is when

pressure to meet short-term performance goals damages long-term organisational performance (eg. by cutting back on training expenditure). Horngren asserted that "despite ... efforts...to have systems designed to stress other goals in addition to the goal of profitability, the accounting system remains the most pervasive formal device for measuring performance".

Horngren argued that, even having goal congruence, individuals also need a "reason for striving toward an objective....Incentive is concerned with getting subordinates to run rather than walk toward the desired goals". To achieve incentive, Horngren argues that budgeting systems have often been a cost-effective method, and also can achieve some degree of goal congruence. However, with poorly designed and communicated systems "budgets are a drain on the funds of the business and are a hindrance instead of a help to efficient operations".

Horngren argued that one means of ensuring desired behaviour (and goal congruence), without close monitoring from above, is by measuring and controlling performance through 'responsibility accounting':

"Responsibility accounting systems recognise various decision centres ... and trace costs (and revenues...) to the individual managers who are primarily responsible for making decisions about the costs in question".

although he recognised that many costs cannot be made a "sole responsibility of one person", and that "there can be over-dependence on an accounting system as being the prime means of motivation".

So far, general behavioural issues have been considered in terms of their involvement in designing management accounting systems. The focus now moves to how behavioural issues arise particularly in cost allocations.

Costing Issue: Costing to influence behaviour

Horngren indicated that in the context of providing information for planning and control "A major feature of this cost allocation is to estimate or predict the impact of various actions on the total costs of the organisation. In addition, the favoured cost allocation method should provide the desired motivation."

Zimmerman (1979) pursued Horngren's conjectures, and argued that allocation of costs can have a number of behavioural effects. For example the allocation may act like a tax, which drives the manager to reduce consumption of perquisites, and "cost allocations also can reduce the agency costs associated with perquisite consumption by inducing the subordinate to act as a monitor of his

superior". In other words, Zimmerman was saying that the establishment of cause/effect is not necessarily the best approach to certain allocations, if the primary goal is treated as being that of influencing managerial behaviour.

Hornigren cited another type of case where allocation according to usage of a service may not be in the best interests of the organisation:

"Are there any service departments whose costs should not be allocated even though they are clearly necessitated by the other parts of the organisation?" "Charging for the auditing or legal services on the basis of the amount provided may discourage their use, even though such use may be very desirable from the standpoint of the organisation as a whole."

Hornigren argued that by charging a flat annual fee or by not charging at all, managers will be encouraged to utilise such services. By charging the flat fee, it may even provide greater encouragement in that "where the user feels that he is paying for the service in any event, so he had better take advantage of its availability". So provided that this does not cause the reverse problem, that of excessive/unnecessary use of a free service, there is another argument against a full reliance on cause-effect or on resource consumption in allocation systems.

So, at the beginning of the 1980's there was clear understanding of behavioural issues in accounting, and in particular in the design of cost allocation systems, by at least some authors. However, during the 1980's and 1990's there has not been evidence of widespread adoption of the ideas (at least in the UK and USA), in terms of published examples of accounting practice, or in the training of professional accountants. The reasons for this are perhaps that the concepts of fairness, ability to pay, and cause-effect linkage are easily understood, and are relatively straightforward to implement, whereas the problem of understanding behaviour is complex and not part of the professional accountant's usual armoury. On the latter point Hornigren wrote that "little is known empirically about the effects on decisions of alternative cost-allocation bases" and that "in one organisation, allocation may be desirable because it induces the desired behaviour. In another organisation, the same allocation procedure may cause an opposite behavioural effect".

One published example of a behavioural approach was at Tektronix, where Jonez and Wright (1987) had concerns about lack of standardisation of components, and sought a means to "quantify and communicate" this concern. This was done by loading almost half of manufacturing overheads onto component-types, with \$687 being assigned to each component-type (ie. leading to a high overhead cost in a product that used low-volume components). They made clear that the \$687 is not necessarily a reflection of any particular cost savings to be gained, but that "it will encourage a certain desired type of behaviour on the part of design and cost-reduction engineering". In

manufacturing, it is known (eg. Nixon *et al.* 1997) that the majority of product cost can be a consequence of decisions taken at the design stage, and there are evidently parallels in the design decisions in universities, for example in the design of new course structures.

Murphy (1991) carried out a survey of practising accountants in New Zealand to determine to what extent these accountants were balancing behavioural issues (as against conventional notions of fairness) in the design of cost allocation systems. The method chosen was to present seven scenarios where judgement was requested as to an allocation scheme, with responses then analysed as to 'fairness' or 'inducement'. The results were that 64% of responses indicated fairness and 36% inducement. It may not be wise to read too much into Murphy's survey results, other than that 'fairness' dominates the thinking of the respondents. By offering response choices like "It will provide an incentive to use the service wisely", the questionnaire may itself have conditioned the respondents to think more of incentive than would have been the case with open questioning (or indeed with a survey of actual practice). So the 64% could well understate the situation.

Although it appears that in the West, there is relatively little interest (by practitioners) in behavioural issues, a different attitude seems to be displayed in Japan. Hiromoto (1988) examined this difference of attitude, in that Japanese "management accounting systems reinforce a top-to-bottom commitment to process and product innovation", and use accounting systems in "more of an 'influencing' role than an 'informing' role". Where there are allocations of cost in Japan, they are often done for behavioural reasons rather than to achieve any notion of fairness or cause-effect linkage. For example Hiromoto quoted manufacturers who allocate costs onto direct labour hours so as to create pressure to reduce direct labour; this is nothing to do with existing costs of direct labour, but is to achieve the long-term corporate objective of a reduction in direct labour. Another Japanese manufacturer allocates costs to products on the basis of component count, not for fairness now, but to encourage designers to reduce component count in future products.

It could be argued that the Japanese are simply following Horngren's advice about goal congruence and incentive. The real difference is perhaps that the Japanese are focusing on long range corporate goals, rather than current-period profitability goals, and are exaggerating the sub-goals so as to increase the motivational level towards them.

Costing Issue: Costing to influence behaviour

Jones *et al.* (1993) gathered together some field research in large companies in Japan. This research indicated little interest in techniques *per se*, but the strong emphasis given to reduction of labour

hours, and to reduction of cost through design of products and production processes. In examining actual practice they concluded that whilst Japanese accounting measurements and techniques may be similar to those in the West, "its application may be dissimilar".

Yoshikawa *et al.* (1994a) carried out a survey of literature on Japanese management accounting, concluding that in Japan there is not a technological superiority, however "the idea of tailoring information to end purposes which involve prompting desired behaviour in accord with strategic objectives appears to underlie much of the development of Japanese management accounting".

Yoshikawa (1994) explored some specific issues further. He explained that, typically, indirect costs (even depreciation) are charged to products on one or more bases, termed 'kousuu', for example labour hours and machine hours. Yoshikawa argued that "these 'kousuu' comprise a physical measure of resource consumption", where the accountant will be as much concerned about monitoring the kousuu levels as with monthly cost variances, and that if approaches such as target costing and value engineering "cannot reduce the number or levels of 'kousuu', they do not retain credibility for cost management... Thus 'kousuu' management is central to all of the diverse approaches to cost management in Japanese companies". In summary:

- Through the kousuu approach, the operating manager sees 'fixed' indirect costs (like depreciation) as to some extent direct and controllable, and this will magnify the incentive effect of reducing resource usage.
- Similarly, even where the indirect cost is linked by a strong cause/effect relationship to the number of items produced (and where an ABC designer would allocate as a cost per unit of output), the allocation is again to resource usage so as to provide incentive.

The literature of Japanese accounting tells us of the benefits in terms of encouraging production efficiency and efficient product design. One could speculate that if the cost system was distorted in this way, creating artificially a loss-making situation for a product, the Japanese reaction seems to be to strive until the product is profitable, whereas perhaps the tradition in the West would have simply been to drop the product! On the issue of cultural differences, Belkaoui (1989) stated that: "A growing body of research supports the idea that there exists a cultural determinism in accounting, whereby a country's culture determines its choice of accounting techniques..."

Recognising the possible impact of the cultural differences between Japan and the West, it might mean that the adoption of kousuu-style allocations in the West should be restricted to the information passed to certain staff (eg. product designers), whereas others (eg. the decision makers in terms of

product mix) should be given information that as closely as possible mirrors real consumption of resources and known cause-effect relationships.

Costing Issue: Complements to unit costing

Another behaviourally-driven approach to cost control has been to move the focus of product designers from that of constructing a product cost, and then determining the price, to an approach where a target market-driven price is established first, and then designs explored to achieve a cost that can deliver profitability (eg. Gaiser 1997).

Hiromoto (1988) pointed out that this approach (common in Japan) means that a quest for accuracy in measuring a 'true' cost is overshadowed by the quest to reduce costs to a desired target. Hiromoto also gave an example of a company that treats "production and marketing ... as separate profit centres", with a transfer price not based on costs but on a "negotiated percentage of the market price", so as to focus production onto market conditions. This latter example bears a certain similarity to the concept of top-slicing in universities. While top-slicing, without allocation of central services costs, perhaps prevents visibility of central costs, it could be argued that it maintains a clearer focus on the market (for the school) than might be true with a complex and confusing set of charges.

Costing Issue: Setting goals

In conclusion in this debate about behavioural impact, it is interesting to note that Kerr (1975) explored a number of examples where organisations had developed "reward systems that 'pay off' for one behaviour even though the rewarder hopes dearly for another". His examples included (United States) universities, in that "society *hopes* that teachers will not neglect their teaching responsibilities but *rewards* them almost entirely for research and publications....Consequently it is rational for university teachers to concentrate on research, even if to the detriment of teaching..."

Kerr suggested that there are four factors behind the widespread divergence between hoped for and rewarded behaviours:

1. The fascination with 'objective' criteria, which excludes aspects of performance that are important but are difficult to quantify.
2. The overemphasis on highly visible behaviour, for example "publications are easier to demonstrate than teaching".
3. Hypocrisy, in that what the manager *really* wants is the rewarded behaviour, and not what the manager says he is hoping for.

4. Consideration of factors other than efficiency, with for example consideration of morality and equity regardless of the fact they are not built into the formal reward system.

Of these, Kerr pointed out that only 1 and 2 are actually producing undesired outcomes, so the whole area has to be approached with care. He also noted that if workers seem to lack motivation towards desired behaviour, then although there are possibilities linked to selection and training, it is usually more practicable to obtain change through modification of the reward systems.

In UK universities, Kerr's points in terms of individual reward systems (eg. publications v. teaching), may also have parallels in terms of reward systems for organisational units. For example, what is the reward system for a school? and for a library? Even if these are clear, then are these reward systems congruent with the desired behaviour from an institutional perspective? In particular, for this research, there should be consideration of the role of cost allocation mechanisms.

2.3.4 Conclusions from the debates

These debates, on relevance, on positive accounting, and on behavioural impact, all serve to illustrate that management accounting (and cost allocation in particular) is by no means simply mechanical or objective application of methods. Methods that are appropriate in one context are not necessarily so in another, and what may seem as logical to the academic accountant (and therefore delivered as normative advice) may in fact have practical and behavioural repercussions not readily anticipated by the theorist. Some specific points arising from these debates are:

- There is a need for costing systems for management purposes, that are different from those developed for external financial reporting.
- Traditional volume-related allocation methods (eg. using labour hours) are not appropriate in many modern contexts of a diverse product line, low direct-labour content, and high levels of indirect costs.
- Costs described as 'fixed' are controllable, and vary, not with output volume, but with the actions taken by management, in particular product decisions.
- An effective management costing system should use projections of future cost rather than historical (or even current) data.
- Expenditures (like training) that provide multi-period benefit should not, in management cost systems, be charged wholly to the current period, as this tends to deter such expenditure.
- Average costing for decision making has some theoretical support in that it serves as a proxy for the cost of degraded service when there is increased sharing of a fixed resource.
- The lack of use of ABC in universities (contrasted with its greater use elsewhere) might indicate a

need for adaptation in this context.

- Cost allocations have behavioural effects, and the design of management accounting systems must take account of these effects.
- Approaching control systems in terms of behavioural effect is more fruitful than attempting to define 'true' cost.
- The Japanese have successfully used an 'influencing' approach to cost design rather than an approach based on establishing 'true' costs.
- Cultural differences suggest caution in anticipating behaviour, when transposing methods from one context to another.
- One Japanese approach is to artificially load overhead onto measures of resource consumption, so as to provide incentive to reduce this consumption.
- Cost allocations onto product characteristics can be used to influence product design.
- Allocations of some services may not be in the best interest of the organisation.
- Market-driven approaches, with a target price driving cost considerations, can be an effective motivational tool.
- Subgoals should be congruent with long-term organisational goals, and should provide sufficient incentive.
- Experience shows that (Western) organisations (including universities) are not always good at developing reward systems that lead to goal congruence.

2.4 Activity-Based Costing

Note: As the original concept of ABC was extended, a number of new acronyms were introduced to reflect this. Rather than utilise a range of acronyms in this thesis, the convention of many writers has been followed in using the term 'ABC' as an overview term to cover all these extensions, as well as its original specific use for determining the costs of products.

The Activity-Based Costing (ABC) approach seeks to understand the causes of the existence of overhead, by focusing on the activities associated with overheads, and then basing cost allocation systems on the cause-effect relationships found. In this section, the literature of ABC is reviewed. Although predominantly experience has been in manufacturing, there has been usage in service industries, in the public sector and specifically in universities.

2.4.1 The Initial Development of ABC

There is some debate about when ABC was 'invented'. Almost all recent interest stems from the work of Robin Cooper, Thomas Johnson, and Robert Kaplan published in 1987-89. Before examining their work, it suffices to mention that consideration of activities as a link to use of resources (and ultimately cost) was not in itself a new concept. For example, as mentioned earlier, Horngren (1977) referred to allocation bases that were evidently linked to levels of activity. What was new in the 1980's was the attention given to activity analysis to address known problems in (Western) manufacturing, associated with loss of competitiveness in the 1960's and 1970's. For example, Miller and Vollman (1985) identified a "hidden factory" where overhead costs occur, whose operation is hidden by simplistic allocations, and where the cost drivers are not physical volumes of production but transactions. Their advice was to seek "to eliminate transactions, and thereby reduce overhead costs", where practicable.

It was only from this point in time that academics and practitioners treated ABC as a key costing method in its own right, as witnessed by the large number of publications from 1989 onwards.

Costing Issues: ABC in cost management; Costing for decision making

Johnson and Kaplan (J&K)(1987) discussed (as noted earlier) the loss of relevance in management accounting, and offered proposals for regaining that relevance. Aside from financial reporting and special studies, J&K focused on two functions for a cost system: facilitating process control and computing product costs. In designing a process control system, J&K suggested that for each cost

centre there should be an attempt "to determine the activity measures that cause cost variation to occur". Aside from standard measures like direct labour hours, examples include "number of set-ups and pounds of material moved for an indirect labour department", with a focus on "explaining the short-term variation in costs". For short-term product costs, J&K suggested augmenting the process-control information with estimates of incremental (but unmeasurable) product costs. However they warned of "a danger in using short-term variable costs" for product decisions, arguing that "these decisions turn out to involve the commitment of the firm's capacity resources and should be made in light of the long-term, not the short-term, variability of costs". They argued that "the most important goal for a product cost system is to estimate the long-run costs of producing each product".

Costing Issue: Selection of drivers

To analyse factory overhead department costs (eg. production scheduling, quality control), J&K suggested that the "task is to identify the cost drivers for these departments.... What demands are placed on the department?" Although in some cases, these demands simply relate to volume of outputs, in general J&K found that other cost drivers are present, eg. number of set-ups, and number of components.

Costing Issue: Fixed, marginal and average cost

J&K stated that "once we have identified the total costs that are driven by each type of transaction, simple division will provide the cost per transaction of each type", ie. they used a form of average costing. For this purpose they suggested that "rather than trace overhead costs to cost centres, as is done in the typical cost system...this procedure decomposes overhead costs into homogenous cost pools.... in that cost variations in any given pool can be explained by a single cost driver". At this point J&K have in effect made a leap from the widely-accepted 'all costs are variable' (in the long-term) viewpoint, to an 'all costs are separable and proportional' assumption. This assumption then underlies nearly all use of ABC that follows in future years. The leap is convenient in that average costing is a familiar approach for most practitioners, however it is somewhat surprising given the known existence of the possibility of joint costs (economies of scope) and of economies of scale. For instance, Lipsey (1966):

"... a theory that predicts the existence of falling, long-run costs under certain circumstances and constant long-run costs under other circumstances is very easily developed. Furthermore, considerable empirical evidence of the existence of both of these phenomena has been provided by numerous empirical studies of the behaviour of costs."

The evidence of economies of scale in universities is mixed, however there are some indications of such economies. Pettifor (1984) for example, in a study of unit costs in UK polytechnics, concluded

that while there was no clear evidence of economies of scale in teaching costs, there were apparent economies achieved in terms of central services. Dundar (1993) however, in a study of a group of US universities, concluded that economies of scale are indeed present in departmental teaching costs, and Glass *et al.* (1996) demonstrated clear economies of scale in undergraduate teaching in UK universities.

In the opening part of this literature review, a distinction was made between the long-term versus short-term dimension, and the average versus marginal cost dimension. J&K are in effect extending the concept of long-term average cost to include activity-based cost drivers (rather than output volumes) as a base for division. Yet if in the long-term there are economies of scale (and so marginal cost differs from average cost), there is perhaps an argument for use of long-term marginal cost for some types of decision making, rather than the average costing implied by ABC.

Costing Issue: Actions after the ABC exercise

J&K pointed out that the allocation processes, often based on assumptions and estimates, will not have the apparent precision of conventional systems, but are a magnitude better than these in terms of the *real* measurement of cost. J&K quoted the results of one such exercise which revealed that 23% of the company's products were found to produce 400% of the profits, with the remaining 77% failing to cover the real cost of overhead resources used for their production. As a result of this type of costing, J&K suggested that management action can be more clearly directed, leading for example to repricing of products or redesign to use standard components. If decisions are taken to drop products, then the method informs as to where overhead resource provision can then be reduced.

Costing Issue: Selection of cost objects

J&K pointed out that tracing of selling, distribution and services costs to products is more complex than dealing with production overheads, and the results even less precise. However the resulting "rough estimate will be a dramatic improvement over current systems that do not identify the specific costs of different segments and channels". In terms of the latter, Bellis-Jones (1989) stressed the importance for suppliers in the retail industry of assessing the profitability of each customer (or type of customer), by focusing on costs of transactions and activities.

Costing Issues: Capital employed; Exclusion of surplus capacity

Kaplan (1988) reiterated the above arguments, relative to the differing requirements for cost allocation when used for financial reporting (eg. for inventory valuation), operational control, and product costing. The following table is extracted from that provided by Kaplan to demonstrate these

differences:

	Frequency	Degree of Allocation	Nature of Variability	Degree of Objectivity
Financial Reporting	Month or Quarter	Aggregate	Irrelevant	High
Operational Control	Daily	None	Variable & Fixed	High
Product Costing	Annually	Extensive	All Variable	Low

In terms of product costing. Kaplan argued that all company costs should be allocated to product costs, with two exceptions: "The product cost system can ignore only two classes of costs - expenses incurred that benefit future products, like basic research or development, and the expenses of idle or unused capacity."

Costing Issue: External financial reporting; Actions after the ABC exercise

Kaplan also argued that the product costing exercise does not need to be part of the main financial accounting system, and does not need to be repeated often (since long-term cost structures do not change rapidly): "Even with only annual updates, managers can use the system throughout the year to influence new product design, introduction, and pricing decisions". Kaplan thus made clear that the proposed activity-based product cost systems are fundamentally different in approach to financial accounting systems, in that everything is aimed at management usefulness (where for example approximate figures may be totally satisfactory for product design decisions), and that separate cost systems are required.

In relation to external financial reporting, an interesting aspect of ABC was raised by Dilley et al. (1997) in that ABC analysis can in fact be used to calculate inventory valuations that lead to reduced taxation. Although there needs to be an awareness of the usefulness of ABC for these purposes, this should of course avoid compromising the management value of the analysis.

Cooper (1988a) commenced a series of four articles (also (1988b), (1989a), (1989b)) in the Journal of Cost Management that defined the ABC approach and gave examples and general guidance, and thereby placed the name 'Activity- Based Costing' firmly in the literature. At about the same time, Cooper and Kaplan (1988), specifically in terms of product costing, presented ABC to a broader audience in Harvard Business Review. The point about precision was well made here:

"The process of tracing costs, first from resources to activities and then from activities to specific products, cannot be done with surgical precision." "But it is better to be basically correct with activity-based costing, say, within 5% or 10% of the actual demands a product

makes on organisational resources, than to be precisely wrong (perhaps by as much as 200%) using outdated allocation techniques."

Costing Issues: Actions after the ABC exercise; Costing for decision making; ABC in cost management

Cooper and Kaplan pointed out that, following an ABC exercise, the information generated allows for options beyond dropping unprofitable products or raising their prices. For example a company may take actions like reducing the price of profitable products (for competitive reasons), redesigning products, or changing manufacturing processes.

Costing Issue: Complements to unit costing

Johnson (1988) made a similar point that activity-based "strategic cost information indicates if a company's activities are cost-effective in comparison to alternatives outside the company, and if the mix of products management has chosen to sell uses activities in the most profitable way." Johnson commended the use of ABC information in improving process efficiencies, for example as part of a value chain analysis of activities. However he did point out that for control purposes, a more effective approach is to use non-financial measures (for example of delays, waste and unevenness) in that these are more controllable than costs, yet ultimately lead to reduced cost or added value and profitability.

Costing Issue: The influence of context

Cooper (1989c) addressed the question of how to identify whether an organisation needs a new costing system like ABC, in that "an obsolete cost system sends many signals" including for example "competitors' prices are unrealistically low". He argued also that organisational/ environmental changes like increased automation and intensified competition also indicate a need to investigate. This latter advice seems relevant to UK universities, given the changes that have occurred in recent years.

Costing Issue: Fixed, marginal and average cost; Costing to influence behaviour

Kaplan and Atkinson (1989) emphasised a key benefit of the ABC approach, in that it forces organisations to investigate the causes of variation in 'fixed' overhead cost. They also made a practical point about assigning service department costs, which has relevance to the choice of bases in ABC. Most allocations are made up of the product of a quantity in units and a price or charge per unit, and they argued that if charges are based on an accurate quantity measure, managers "will probably not spend much time arguing about minor fluctuations in its unit price" but "will act to use the quantity of the resource they consume efficiently and effectively".

By 1990 then, the ABC concept had been defined. It had started with an orientation to developing realistic product costs, driven by the recognition that simplistic product-volume-related allocations were leading to faulty decision making. Some key points in this approach were as follows:

- 'Fixed' costs should be viewed as variable and controllable in the long term.
- For strategic decisions (eg. on product mix) it is the long-term cost structure that matters.
- In making decisions it is the demand placed on future resources that matters, the supply of which can be matched to demand by subsequent management action.
- Temporary phenomena like idle capacity are irrelevant.
- Basic research and development expenditure that cannot be linked directly to products should be excluded from allocations.
- Being approximately correct is better than being precisely wrong, ie. the key to allocations for management purposes is matching cause to effect, even if imperfectly, rather than choosing a method simply because it can be precise.
- The external financial reporting system is generally not suitable for these purposes.
- Most overhead costs are driven by activity levels in the organisation rather than by product output volumes.
- The ABC analysis can extend to cost objects beyond products, eg. customers and distribution channels.
- ABC treats overhead costs as being separable into 'pools', each of which is then allocated as if proportionally related to the driver volumes.
- Many actions are possible resulting from the ABC information, including product mix decisions, product pricing, product design and process design.
- ABC is not an answer to all costing problems. In particular, for control purposes, non-financial measures may be more effective.
- ABC may be more suited to some contexts than others. The context comprises both internal organisation and external environment.
- In designing an ABC system, care has to be taken concerning its behavioural effects.

2.4.2 The Growth of Interest in ABC

Following the initial publications, ABC became a popular topic for academic enquiry, and this was accompanied by experiments and trials on a wide scale, particularly in manufacturing, so that

academic theorising was strongly supported by empirical studies. This all added to the general credibility of ABC, and in some cases added detail to the basic theoretical concept. In this section attention is restricted to a selection from the many publications, focusing on those that provided this added detail. In subsequent sections there is consideration of the extension of interest into the service, not-for-profit and university contexts, and also the literature that has drawn attention to the limitations of ABC.

Although the primary initiatives on these methods were in the USA, they immediately came to visibility in the UK. For example, in Maskell (1988), Robert Kaplan was interviewed for the journal 'Management Accounting' (UK) following the publication of Johnson and Kaplan (1987). In this article, Kaplan explained the ABC approach and gave guidance for implementation, based on current work in manufacturing organisations. One empirical finding was that although large numbers of cost drivers were possible, in practice companies seemed to manage with about ten significant factors in terms of product cost. Other early examples in the UK were Drury (1989) which presented the methods in detail, and Jeans and Morrow (1989), which gave details of successful exercises in the USA, conducted by Robin Cooper and Robert Kaplan. Two useful pointers emerged from these exercises:

- "The introduction of even just one new cost driver ... can radically affect product costs and management's view of the business".
- In allocating cost (in manufacturing), it is useful to think of this being to a particular level in a hierarchy from product unit to plant/facility.

These two aspects were expanded upon in Cooper (1989a) and Cooper (1990) below.

Costing Issue: Selection of drivers

Cooper (1989a) explored in some detail the issues of selection of drivers, and of the number of drivers that are necessary, if the costs of the ABC exercise are not to be un-necessarily high relative to the benefits. Babad and Balachandran (1993) in fact used mathematical methods (integer programming) to explore this balance between cost and benefits of the exercise, although Dopuch (1993) questioned the practicality of their information economics methodology. A specific point made by Cooper is that in many situations, it is more cost-effective to use *numbers* of transactions as drivers rather than transaction measures like duration, in that numbers are easier to measure, and are in some cases already recorded. Where there is great variety between individual transactions, Cooper suggested splitting "into categories that consume different quantities of inputs", using two or more cost drivers for the categories. In fact, the author of this thesis met a similar problem in a publishing organisation (Mitchell and Wycherley 1994), but dealt with the multiple categories in a

similar way to Gietzmann's (1991) 'customer load factors', by assigning a 'workload factor' to each, and then using a single driver based on the weighted numbers. In determining the optimum numbers of drivers, Datar and Gupta (1994) showed that seeking more accuracy through increasing the number of drivers can in fact be counter-productive if those drivers are subject to relatively larger measurement errors.

Costing Issue: Selection of cost objects; Costing to influence behaviour

Cooper (1990a) added further clarification to the way ABC can operate in manufacturing by allocating cost to the most appropriate level in the hierarchy: unit of product/ batch/ product line/ facility. This introduces a finer gradation than variable/ fixed, and is an important discipline for consideration of appropriate allocation bases. The article is also interesting in the insight into the practicalities of implementing ABC. Firstly, of the six manufacturers studied, that used ABC systems, none used all four levels of Cooper's hierarchy. Cooper ventured various explanations for this, in particular that the organisations gained large improvements in product cost accuracy in moving from two to three levels, sufficient to meet their needs, and providing little incentive to introduce the complexity of four levels. Secondly, these companies generally considered behavioural aspects when choosing drivers during the design of the ABC system, for example one company used a driver 'number of different part numbers' to influence future product design.

Costing Issue: Costing to influence behaviour

Dugdale (1990a) reviewed ABC alongside some other new approaches. In particular he reviewed the concept of 'throughput accounting' developed by Galloway and Waldron (1988). This focuses (unlike ABC) on obtaining maximum short-term profitability given a set of 'fixed' overhead costs (which for many organisations includes the 'direct' labour workforce), by loading overheads onto the usage made of the 'bottleneck' facility in a factory. This deliberate distortion of the cost allocation is perhaps akin to the longer-term behavioural approaches discussed earlier, although less easily applied from a longer-term perspective, for example having to cost in terms of anticipated rather than current bottlenecks. Dugdale speculated on how the various approaches could be used in combination. and concluded that this is indeed possible, although:

"Whilst ... a number of techniques can complement each other, there seems to be an exception in that the Japanese 'influencing' philosophy of cost accounting cannot be easily reconciled with the other ideas and techniques."

Costing Issues: Currency of information; Joint costs; Fixed, marginal and average cost

Innes and Mitchell (1990) argued that when ABC is used to support decision-making "It is future differential outlay costs not historic costs which are relevant to such decisions", and that as ABC is

primarily concerned with long-run product costs, there is a particular danger in relying on historical cost information. Further they pointed out that "it is important that consideration is given to an analysis of the behaviour of each activity driven cost" for example where costs are a function of several variables, and where economies or diseconomies of scale are present.

Costing Issues: Actions after the ABC exercise; Behavioural consequences of the ABC exercise

Brimson and Fraser (1991) and Morrow and Connolly (1991) described an approach 'Activity Based Budgeting' developed by their consultancy firms. This approach endeavours to integrate the activity analysis done for ABC with the planning and budgeting processes of the organisation, and underscores the empirical findings of other writers that ABC exercises often are as valuable in terms of understanding organisational processes and their costs, as in terms of cost allocation mechanisms derived. For example, Bailey (1991), in a survey of UK companies, mentions an "unexpected bonus" in improved cost awareness by management, and Gietzmann (1991) noted some beneficial consequences in terms of better understanding of costs, for example sales staff understanding the production implications of special offers to customers. However, in considering the behavioural effects of ABC, Innes and Mitchell (1990) warned of possible dysfunctional consequences with a cost per unit performance measure in that the service provider may be able to artificially increase the number of units (eg. purchase orders) and thereby decrease cost per unit, even though no costs are saved in total. McGowan (1994) also noted dysfunctional aspects of adopting ABC systems, although, in the companies studied, behavioural consequences were generally positive in terms of attitudes shown to ABC and cost issues.

Costing Issue: ABC in cost management

Cooper and Kaplan (C&K)(1991) showed an interesting development, in that the authors, having originated ABC as primarily a product costing process, were now giving equal emphasis to its role in cost management (eg. through process improvement). They pointed out that the traditional macro-level approach, for example to "hold expense growth to 5%" generally fails because (unlike ABC) it ignores the reasons for existence of the expense.

Costing Issues: Selection of cost objects; Fixed, marginal and average cost

C&K revisited the manufacturing cost hierarchy (unit/ batch/ product/ facility), extending the idea to customers, brands and so on. One aspect that seemed to be somewhat contrary to earlier views (that *all* costs are potentially variable in the long-term) was that "in ABC, facility-level expenses are kept at the plant level and not allocated to products." This would appear to be overly simplistic, in assuming that none of the facility cost is in the end variable. If a reduction in unit volume, or

product range, can release space within the facility which has an opportunity value in terms of other uses, then there would indeed be a rationale for allocation to products.

Costing Issue: Joint costs

The reluctance to allocate facility costs is mirrored by a reluctance also to allocate joint costs, for example allocating general advertising to individual brands. Yet to follow C&K's advice is problematical. If all joint costs are to be left unallocated, then there may remain a whole series of islands of cost not allocated, none of which are then incorporated in the product cost. What use then is the resulting product cost for pricing or product mix decisions? In practical terms, for these purposes, joint costs cannot be ignored, without discarding entirely the concept of a product cost. A related problem could in fact occur (not mentioned by C&K) involving jointness between the product hierarchy and the customer hierarchy. C&K talk of assigning a cost to a customer when it is customer related, but how would say an advertising cost be assigned, that was for a specific product, aimed at a specific customer? If the cost is assigned to neither, then the cost is 'lost', but there are equally uncertain results by allocating to either or to both. One can perhaps see why the six companies surveyed in Cooper (1990a) all focused primarily on product cost, and fully allocated facility and other costs, thus avoiding these philosophical issues.

Costing Issue: Actions after the ABC exercise

C&K suggested this sequence of actions after an ABC analysis:

- Re-price products and adjust product mix
- Seek ways to reduce resource consumption, by reducing activities per unit of output or reducing resource consumption for each activity (for example through product or process redesign)
- When resource consumption decreases, eliminate or re-deploy freed-up resources (ie. reduce resource spending in line with the reduction in resource consumption)

In the latter point, they were distinguishing between demands on resources (which ABC should reduce) and resource spending. This they reinforce by the statement that expenses are fixed only where managers do "not take the actions required to make them variable".

Costing Issue: ABC in cost management

Many later writers similarly echo the value of ABC in cost management, although Johnson et al. (1991) warned that "danger lurks when companies use the same driver-cost information to manage operating costs". Their point is that firstly the process may be far more complex than would appear from the driver information, and secondly a costly process could still be adding value for the

customer. They recommended that having identified a high cost process, it is worthwhile to carry out a more detailed activity analysis of the process before taking action. They also suggest that it may be worthwhile to do this (and perhaps then reduce costs or improve efficiency) before committing to product mix changes.

Faced with the time and cost of obtaining the additional level of detail needed for cost management, Brimson (1998) approached the issue of product cost by considering the 'features' of the product and their impact on process cost (with a similar approach to Walker's (1991) 'attribute' costing, and to the methods of functional cost analysis (Yoshikawa *et al.* 1994b)). Brimson's argument was that a simpler (lower cost) ABC system could result where allocation to a large product range is replaced by allocation to a smaller set of product features, and that process/ product design would then be better focused. While one might argue that product attributes or features should in any case naturally emerge as drivers in a fully detailed ABC exercise, Brimson's point was to focus attention on these, so that these controllable aspects are not lost in the aggregation with uncontrollable drivers. There may well be a parallel here in universities in insisting on a separation of say undergraduate v. postgraduate costs, rather than assuming that a separation would automatically appear in the ABC exercise.

Costing Issue: Exclusion of surplus capacity

Cooper and Kaplan (1992) illustrated the need to exclude surplus capacity from ABC, with an example where a department with a capacity to handle 1250 purchase orders only processes 1000 in a particular month. Their suggestion is that the allocated cost per unit should be based on the 1250, rather than the 1000, so that a charge is not made for the surplus capacity. While this is rational if the capacity were truly surplus, there would appear to be dangers. Bromwich and Bhimani (1994) made the point that "idle capacity cannot always be viewed as ... reflective of the inefficient use of resources", for example where the capacity is necessary to cover normal business fluctuations.

Costing Issue: Acceptance v. applicability

As well as Activity-Based Budgeting (ABB), the terms "Activity-Based Management" (ABM) and 'Activity-Based Cost Management' (ABCM) came into usage to reflect the role of activity analysis beyond the costing of products (or customers etc.), for example in improving operational efficiencies. Booth (1992) light-heartedly prefaced his own consultancy's approach with: "A whole new family of initials has been spawned - the activity-based acronyms, or ABA's for short". What was happening with ABC was that the original concept was maturing. Although the originators of ABC were clearly aware of the wider uses of the activity analysis results, their primary original focus had been

product costing. As empirical evidence was gathered, augmented by academic research, it became evident that the other uses of activity analysis were equally important.

Costing Issue: Development of strategy

An important point made by Cokins *et al.* (1993) was that in many business sectors, competitors can readily copy successful products, but find it more difficult to copy processes, hence: "The lesson learned is that superior business and manufacturing processes offer greater and more sustainable advantages than products". Cokins therefore saw ABC as having an important role in providing the information needed to implement 'Business Process Re-engineering' (BPR), and in providing new insights through activity analysis.

Therefore, as the ABC methods became more widely discussed and utilised, the following represent some additions to the initial ABC concept:

- The conventional variable/ fixed demarcation of cost can be more usefully replaced with a hierarchy product/ batch/ product line/ facility, but in practice organisations achieved most of the improvement by moving only to a three-tier hierarchy.
- ABC should use anticipated future costs, rather than historic or current costs, unless these reflect future costs.
- ABC is necessarily an approximation where costs are not separable into single-driver pools (eg. joint costs), or where costs are non-proportionally related to drivers (eg. where there are economies of scale), yet these costs cannot be ignored in the cost calculation.
- Idle capacity that is temporary and has no relationship to long-term operation should be excluded as a cost. However, where it is a necessary consequence of normal business activity (eg. required to cover variation in workload volumes), then it should be included.
- The more drivers that are used, the more complex and costly is the ABC exercise, so that a balance has to be found between the benefits and these costs.
- While a large number of drivers is possible, organisations can meet most of their product costing objectives with about ten drivers, and some organisations have achieved significant benefits with just one additional driver.
- Numbers of transactions are a convenient proxy for more complex measures of transaction workload, provided the variation of workload between transactions is limited.
- ABC can highlight the cost of complexity (eg. component variation) and can facilitate the use of allocation drivers to influence product design.
- The ABC design needs to anticipate possible dysfunctional behaviour arising from allocations, if used for performance measurement.

- ABC information can be used to develop flexible budgets.
- ABC exercises improve cost-awareness in an organisation, and the understanding of the real causes of cost.
- ABC is as important as a cost management tool as a product costing tool.
- The sequencing of actions after an ABC exercise is important. In particular, ABC may reveal the possibility of process and product changes which in consequence change the cost structures, so as to invalidate the initial view on product mix decisions.
- ABC is often not appropriate for short-term decision making, where alternative methods are available, for example focusing on current resource constraints/ surpluses and bottlenecks.
- Companies can gain greater strategic advantage by using ABC to support process changes rather than product changes (which are more easily copied by competitors).

2.4.3 The Limitations of ABC

An issue for ABC common to many new methods is establishing whether the introduction of the methods definitely leads to increased profitability or net benefits. In fact, Cooper (1988b) said that the benefits of an ABC system "... although real, are difficult to quantify", and Bromwich and Bhimani (1994) stated that:

"... the ultimate test is whether, in the long term, companies which adopt ABC become more profitable. Such evidence is not available on an aggregate basis and is unlikely to ever produce definite results because of the difficulty in assigning profitability to changes of a single factor such as a costing system".

It would appear therefore that it cannot be 'proven' that ABC is beneficial, but that supporting evidence has to be established through theoretical argument, making use of the limited empirical evidence, that this is so, in various contexts. In establishing the boundaries of its usefulness, particularly important are those publications which have considered the limitations of ABC.

Costing Issue: The influence of context

It is evident that the usefulness of ABC is related to the context in which it is used. Gosselin (1995) noted the influence of business strategy, and also of organisational structure, observing for example that centralised organisations were more likely to implement ABC after initial investigation. Fechner (1996) noted that in some contexts the level of overhead is (at eg. 30% to 40%) not as high as the typical ABC success stories, and that in these contexts, added complexity (to ABC) increases costs of the exercise with little improvement in the results for product cost.

Bromwich and Bhimani (B&B) (1989) and (1994) are typical of a balanced approach to ABC, presenting it as a useful tool within limits. B&B (1989) concluded that ABC was an important new method, backed up by empirical evidence of success, however they pointed out that some of the published success stories for ABC were of companies that appeared to have problems more fundamental than their choice of accounting systems. For example, they believed that where the issue was product pricing, some companies could have solved the problem "more easily by looking towards market prices than by reforming accounting systems in complex ways". In B&B (1994) they reported a similar situation, and reminded of the difficulties of dealing with truly fixed costs, economies of scale (proportionality), economies of scope (where activities interact), and allocation over time-periods.

Costing Issues: Opportunity cost; Selection of cost objects; Fixed, marginal and average cost

Dugdale (1990a) and (1990b) placed ABC in perspective relative to other accounting methods and pointed out that, as practised, ABC (a) commonly ignores the principle that sunk costs should be ignored in decision-making, (b) ignores the concept of opportunity cost, (c) overemphasises allocations to product (compared with eg. customer or market segment), and (d) accepts too easily the concept that all costs vary (an underlying premise of ABC).

Costing Issue: Behavioural consequences of the ABC exercise; Costing to influence behaviour

Merchant and Shields (1993) (M&S) pointed out that although ABC proponents "claim that the more accurate cost data improve managerial decision making", there is evidence that in some cases the "reporting and use of more accurate cost measurements is not in an organisation's best interests". M&S gave three types of deliberate use of non-accurate cost data: (1) over-statement of cost (eg. to protect the company from excessively small margins when prices are set), (2) under-statement of cost (eg. to stimulate use of a service function like internal audit), and (3) lower precision (as in the Tektronix example above, also quoted by M&S). M&S cautioned that the choice of cost system depends on the purpose for which it is to be used, and that while accurate costs are important when *developing* strategy, they are often not appropriate when *implementing* strategy. To successfully achieve the latter, for example by motivating employees or by helping them learn, M&S argued that an accurate cost system is probably too complex anyway (providing too many signals), and is not focused on the "principles of learning and motivation".

Costing Issues: Fixed, marginal and average cost; Opportunity cost; Costing for decision making

Mitchell (1994) clarified some of the limitations of ABC, including for example (in control uses) the lack of attention to behavioural issues, and (in budgeting) "the danger of assuming linearity in cost behaviour". However he defended the method for use in decision making, in that the "relevance of average cost information to decision making is a key component of profit maximisation in the classical economic theory of the firm", and in this sense (aside from situations that require opportunity costing) ABC "can be viewed as providing best available practice in obtaining average cost information". He also reminded us of Zimmerman's (1979) argument that average costing (and by implication ABC) provides a valid proxy for the opportunity cost of shared use of limited resources.

Costing issue: Costing for decision making; Fixed, marginal and average cost

Not all criticism has been productive. Typical of wrongly-focused attacks on ABC are Sharp and Christensen (1991) and Humphreys and Shaw-Taylor (1992), which misrepresented ABC in attacking its full absorption approach, by selecting scenarios with relatively few (even two) products and conjecturing that dropping one product will not allow a reduction in 'fixed' costs. In both cases, they tested ABC in terms of the *short-term* impact of dropping a *single* product, assuming that costs like rent, salaries, supervision and depreciation remain fixed. This focus on short-term results was never the intention of the ABC approach, although it may perhaps have been the approach of some who apply the methods inappropriately or simplistically, losing sight of their real purpose and range of applicability.

Costing Issue: Actions after the ABC exercise

In a more reasonably argued article, Piper and Walley (P&W)(1990) started an interesting exchange in Management Accounting (UK), with a number of criticisms of ABC, triggered by a fairly conventional pro-ABC article by Jeans and Morrow (1989). P&W in particular took issue with the concept that 'activity causes cost'. Cooper's (1990b) response to this was that P&W had (commonly held) misconceptions about ABC, in particular by considering short-term resource expenditure, whereas ABC was always intended to examine long-term demands on resources, with matching actions to reduce expenditure only if circumstances permit. Piper and Walley (1991) responded to this by widening their criticisms, for example pointing out ABC's lack of relevance to capital and period costs, and in turn, Fox (1991) then criticised the whole debate as being non-productive. Perhaps the most useful lesson from this is that ABC is evidently sufficiently complex to permit misunderstanding and misrepresentation, so that any normative advice may need to be carefully

reviewed as to whether its practical implementation will always be as intended.

Costing Issue: Costing for decision making; Fixed, marginal and average cost

Cooper and Kaplan (1992) responded to earlier examples of these types of criticism by pointing out that whereas product-drop decisions are often handled in textbooks by a marginal-cost or decision-relevant approach, the reality for product mix decisions in companies with large and diverse product ranges is that it is impracticable to compute such costs for the myriad of product-mix combinations that are possible. So another approach has to be taken, and ABC provides a solution, making computations feasible, by assessing the contribution of each product to the aggregate demands on resources.

Costing Issue: Joint costs

Noreen (1991) used mathematical methods to explore the conditions under which ABC systems are relevant, in terms of cost-activity-product relationships. If ABC product costs are to represent avoidable costs (for product drop decisions) and ABC overhead rates are to represent incremental activity costs (for product design decisions) then Noreen established three conditions that must hold:

- Cost can be partitioned into cost pools, each of which depends only on a single activity,
- Cost is proportional to activity level, and
- Activity volumes can be partitioned by product.

While the issues of joint (ie. non-partitionable) costs and proportionality are already known, the reminder from Noreen is useful, particularly in stressing that in the ABC two-stage process, the jointness issue arises both in cost-activity relationships and in activity-product relationships. In dealing with non-proportionality, Noreen echoed other advice that "costs that are not strictly variable at the level of the cost pool should be excluded from the allocations and handled in some other manner".

Costing Issue: Selection of drivers

Roth and Borthick (1991) voiced similar concerns to Noreen and suggested the use of regression models to determine the appropriate allocation model where a cost pool is dependent on several drivers or might contain a fixed cost element. Unfortunately their regression examples are unrealistic (involving zero residual error) so that the reader is not at all warned of the difficulties involved with real-life data. Also they make an implied and perhaps unjustifiable assumption that attention only has to be given to functions that are a linear combination of driver volumes, ie. not allowing for non-linearity or for interaction between driver variables. All the same, they did make a valid point that regression may be a tool that can be explored further for these cost issues.

Costing Issue: Development of strategy

In considering authors who criticise ABC, even Johnson (1992), one of the originators of the method, should be included. Johnson stated:

"As someone who helped put the activity-based concept in motion, I feel compelled to warn people that I believe it has gone too far. It should be redirected and slowed down, if not stopped altogether."

These are dramatic words! However, Johnson did proceed to recognise the real value of ABC in rationalising the view of product costs, and in focusing attention on the causes of cost. His warning was that while cost control and product mix rationalisation might have brought a competitive edge in the 1970's, there is a danger that users of ABC may become complacent and think that the same is true in the global competitive markets of the 1990's. He suggested that the key to competitiveness now is a focus on customer needs, and on developing and improving processes to meet these needs, and that it will not be sufficient for a company to use "activity-based information simply to improve how it does business as usual".

Shank and Govindarajan (S&G)(1993) in fact placed ABC firmly in a strategic framework. They proposed three key themes for managing long-term costs effectively: Value Chain Analysis, Strategic Positioning Analysis, and Cost Driver Analysis. The value chain approach reminds us that the organisation has strategic choices in the continuum from raw materials to end-consumers, and that cost analysis should support this, and not just focus on currently internal processes. Strategic positioning analysis reminds us that a business can compete not only on the basis of cost leadership, but also on product differentiation.

Costing Issue: Complements to unit costing

S&G took a view of cost driver analysis that embraced strategic decision choices (Scale, scope, experience, technology, complexity), as well as operational factors (eg. participation, quality, capacity utilisation). Some aspects were seen as difficult to quantify in terms of the cost-driver relationship (eg. technology), and some were considered best addressed by non-financial measures (eg. quality). However, ABC was seen as having a clear role in measuring the cost of complexity.

However, S&G concluded that there are three basic problems with the ABC method in a strategic context:

Costing Issue: Currency of information; Actions after the ABC exercise

- Static versus dynamic view of costs. The static view accepts the cost as is, but the dynamic view

focuses on reducing or eliminating costs that are not value added. S&G believe that it may be dangerous to focus on a product cost that contains a current cost that either adds no value, or is magnified by current inefficiencies. S&G pointed out that although many writers emphasise that ABC is a pre-cursor to activity-based management, in practice it is "difficult to avoid the pitfall of basing management decisions on ABC results that incorporate activity costs that have not been 'value-engineered'."

Costing Issue: Restricted view of product cost

- Restricted view of product cost. The cost of a product needs to embrace all costs, both upstream (eg. product development) and downstream (eg. customer service) for that product. However, often the latter costs are incorrectly assigned, or worse still, omitted from the analysis. S&G mention 'factory cost myopia' where the analysis is restricted to manufacturing costs, even though marketing costs for example could differ considerably between product lines.

Costing Issue: Currency of information

- Assumptions that current strategy will continue. In a changing environment, organisation strategy will be expected to change (eg. as to breadth of product range), yet an ABC analysis will only reflect current strategy.

In summary, some of the literature on limitations of ABC has misunderstood or misrepresented ABC (generally by applying it to short-term product mix decisions). However, this literature in general has established some real limitations on ABC, some added understanding of its applicability, and its relationship to alternative or complementary approaches:

- ABC product costs need to be based on allocations of costs as they *will* be, following cost management exercises, rather than costs as they currently exist.
- In product costing, ABC needs to embrace all costs from product development and marketing to after-sales customer service, and avoid a focus simply on production cost.
- ABC analysis needs to take account of future/ intended strategy (eg. on breadth of product range) rather than current strategy.
- Complications in the use of ABC arise from dealing with joint costs, economies of scope, costs arising from past decisions, non-proportionality, and allocation over several time periods.
- Jointness in costs can arise in ABC in both the cost-activity and the activity-product relationships.
- ABC in practice often ignores the opportunity cost of resources.
- ABC as applied ignores the fact that some costs are truly fixed even in a long-term perspective.
- It may be possible to use statistical regression analysis to determine an appropriate set of drivers

where alternatives are possible, and to detect non-proportionality in a relationship.

- Although ABC can be applied to cost objects other than products (eg. customers), this is generally not considered.
- ABC can be viewed as 'best practice' in applying average costing, which is a theoretically supportable approach to long-term decision making.
- ABC average costs can serve as a proxy for the opportunity costs of degraded service, which might be ignored in a marginal costing.
- Product-drop decisions within large product ranges are generally taken in combination. The number of combinations possible prevents a marginal costing or decision-relevant approach, but ABC provides a supportable approach to assessing the effect of a combination of decisions.
- ABC's empirical successes could sometimes have been achieved by alternative methods, especially where major problems were being experienced.
- It is difficult to quantify the benefits of ABC from empirical results, because of other concurrent actions and business changes, so its justification has to be partly based on theoretical reasoning.
- ABC's role is clearly in terms of the long-term demands made on resources, yet it seems the concept is sufficiently complex so as to lead to its mistaken application in short-term scenarios.
- Accurate ABC costs may not be appropriate for implementing strategy, because of their lack of focus on behavioural impact (eg. learning and motivation), and their complexity.

2.4.4 ABC in Non-Manufacturing Organisations

The origins of ABC were in manufacturing, and much of the subsequent literature was also primarily concerned with this context. However, from the start, there was interest also in applying ABC to other contexts, in services, and in not-for-profit organisations. Kaplan (1994) reviewed the early development of ABC in the late 1980's noting: "And service organisations, such as banks, transportation companies and health care institutions, were also beginning to use costing systems with the same underlying structure of those we had observed in innovating manufacturing companies".

Costing Issue: The influence of context

While applications in service organisations seem to have not differed fundamentally from those in manufacturing, there are evidently differences due to context. Relative to contextual influences, and the 'contingency theory' approach, Belkaoui (1989) surveyed the work of several researchers in the

design of accounting systems, and concluded that: "a general strategy applicable to all organisations does not exist" and that "the design ... depends on specific contingencies" including technology, organisational structure, and the environment. As a university is perhaps unique in its organisation, its use of technology, and its environment, this would indicate that a university may therefore require a unique set of accounting systems. In all of the examples that follow, this influence of context on costing systems can be recognised.

For example Cooper and Kaplan (1992) presented a case study of a railway, which differed from a manufacturing situation in that direct costs are almost absent, so presenting a particularly pressing need to understand the 'fixed' costs, and the consumption of the associated resources by the various transportation services offered. In this case a move to activity analysis was prompted by deregulation in the early 1980's, and the need to understand the cost structure of these services. Another aspect that differentiated this situation is that most expenditures on maintenance (of track and vehicles) were necessitated by *past* rather than present use of facilities.

Costing issue: Costing for influencing external bodies

Similarly, Bussey (1993) described activity-based systems developed by British Telecom, where accurate costing had become necessary to support pricing policy in monopoly markets, and to prove that cross-subsidisation was not occurring "between competitive and monopoly activities". The situation was again of minimal direct costs (from the placing of telephone calls), and also involved many situations of joint cost.

In financial services, Sephton and Ward (1990) contended that ABC was well-suited to dealing with central overhead, both in product costing and in helping to target high-cost activities for action, but noted a particular problem that many costs were associated with groups of products (eg. mortgages) rather than with individual products.

Antos (1992) commented that in a bank, security expenses are really driven by the risk of robbery involved in cash transactions, so should not be charged as part of a general overhead (eg. to mortgages or business loans). He quoted one Dallas bank that followed this logic, to go entirely non-cash, reducing security costs substantially (eg. eliminating the need for security guards).

Costing Issue: Opportunity cost

Antos also described a charitable organisation where fund-raising events were costed on an activity basis, so as to maximise the benefit from the limited fund-raising resources available. Perhaps an

aspect unique to not-for-profit organisations was that an opportunity cost value had to be ascribed to volunteers' time as part of the costing exercise.

Costing Issue: Capital employed

Finally, Antos described how a computer service organisation, subject to increased competition, reduced general overhead rates by narrowing down costs to particular types of contract. One interesting point that Antos mentioned concerns the "carrying cost for unbilled work". The activity analysis had identified that where items had not yet been billed (due to partial completion of contracts, or holdbacks), there was an associated carrying cost, and Antos commented that "these unbilled costs are similar to a manufacturing company's work-in-process and finished inventory". Although this is stretching the use of the term 'inventory', Antos is correct in that these are indeed real allocatable costs, which raises the question as to whether the same applies to all organisations which receive payment later than delivery. Possibly even more problematic is the situation where payment occurs before delivery (as occurs widely in subscription sales), where some sort of cost credit would appear to be justified, both in costing products and costing types of customer. This could well be an issue in universities, where often payment precedes delivery, giving rise in effect to a 'negative' working capital.

Costing Issues: Acceptance v. applicability

In the UK National Health Service (NHS), the introduction of market-type practices and the squeeze on government funding led to interest in topics like 'speciality costing', which in turn caused interest in activity analysis. Holford and McAulay (1987) describe efforts in one region: "Costs such as drugs and meals may generally be viewed as variable in nature, but the way in which other costs vary with changes in activity levels is less clear". By 1993, interest in ABC in the NHS had been sufficient to support a book of guidance (CIMA 1993) on this subject. The conclusion of this book was that ABC "appears well suited to satisfy the information needs of the NHS", albeit that "there appears to be little empirical evidence of the use of this method...".

King *et al.* (1994) reported on four case studies at NHS hospitals, with similar conclusions to the CIMA report. On the basis of their research, they saw a potentially valuable role for ABC, although they argued that the realisation of this role depends on:

- Targeting specifically the purposes for which ABC is intended and tailoring the system design to these requirements.
- Providing the resource to design, implement and disseminate the system.
- Consulting and using the information generated in a manner sensitive to the culture of the

hospital sector.

While the NHS is a different organisational structure from HE, and there are differences in the way markets operate, and in the concepts of customers and products, it shares the public-service tradition of budget-based control, and sensitivity to the non-profit aspects of its role. Therefore the above requirements may well have a parallel in HE.

Costing Issue: Devolved decision making

It is clear from these latter publications that the NHS organisation as a whole had devolved some decision making to its organisational components so far as for example to permit a 'Trust' to negotiate the charges that will be made to it by (competing) hospitals. What would have been a centrally determined allocation of cost (perhaps using ABC) had been replaced by an 'allocation' negotiated between the service provider and user, in a free-market process.

Rotch (1990) considered the role of ABC in a variety of service industries, including railways and healthcare, and an example of use in a computer service bureau, where an important benefit was the analysis of customer costs (eg. separating acquisition from servicing), which led to a change in pricing policy, and streamlining of the customer acquisition process. Rotch concluded that ABC is just as applicable in services as in manufacturing, but that special factors do arise, for example: output is often a "package of service benefits", many joint costs apply, a service may draw widely from the organisation, and "service cannot be inventoried".

Costing Issue: Complements to unit costing

Lapsley *et al.* (1994) examined cost management generally in the UK public sector, concluding that ABC is a valid approach to product costing in this sector, with the potential for differential pricing, product redesign, etc. They reminded us however that in assessing performance, it is important to maintain a view of all three issues: Economy (in the acquisition of resources), Efficiency (in the use of resources), and Effectiveness (of the final outputs).

In summary then, it is clear that ABC is applicable in non-manufacturing organisations, but that its application is governed by the specific context. Some issues that have arisen may not be particularly relevant to the HE context (eg. low levels of direct cost, or expenditures necessitated by past usage), but many issues do appear to be potentially relevant:

- The context (organisation, technology and environment) influences the choice of accounting systems.
- Devolution of an organisation into 'free-market' interacting components lessens the need for

allocations, replacing them with negotiated charges.

- There can be a lack of empirical use of ABC (as in the NHS) in spite of strong normative advice.
- Working capital costs (or benefits) arising from differences in timing between expenditure and income should be included in the costing process.
- In Service contexts:
 - costs may be associated with product groups rather than specific products,
 - output is often a package of benefits, and cannot be inventoried,
 - many joint costs apply.
- In the public sector:
 - there are external concerns about cross-subsidisation within the organisation, which necessitate the use of cost allocations,
 - economy and effectiveness are as important as efficiency, in terms of overall cost-effectiveness of the organisation.
- In not-for-profit organisations:
 - there is a need for sensitivity in applying these methods,
 - there is a particular need for opportunity costing of limited/ constrained resources where resources are acquired (eg. through donation) below real cost levels.

2.4.5 ABC in Universities

Technically, ABC as a named method had not been in existence until the 1980's, but as with industry, similar approaches had existed previously in universities, at least in partial form.

Issue: Joint costs; Exclusion of surplus capacity

Bottomley (1972) described a project undertaken at the University of Bradford entitled "Studies of potential economies per student year". Some proposed allocation methods bear similarity to ABC, for example the cost of technicians was carefully investigated, and found to be linked most closely to the laboratory space supported, and was so allocated. Library costs were allocated by a points system reflecting demand by staff and students in different subject areas. Other allocations were evidently more simplistic, for example central administration was simply allocated on the basis of student numbers. Bottomley certainly supported the use of this allocated cost information, for example to create budgets and plans based on programmes rather than simply on categories of expenditure. However he did caution that "virtually every resource used by the university contributes to the output of more than one programme - nearly all costs are, in one way or another,

joint costs". Also at Bradford there was a known surplus of premises space, which inflated the allocated costs; Bottomley was clear that this component of the average cost was not relevant to expansion decisions. In all, it seems reasonable to say that the allocation system at Bradford was at least a partial approach to ABC.

Costing Issue: Costing for decision making; Fixed, marginal and average cost

However, in the usage of the allocated data, Bottomley was at variance with the ABC approach. In a hypothetical proposal to expand a course, Bottomley warned against using the costs for decision making: "The university would not save in any real sense [the allocated costs of buildings and staff] by discontinuing the course". Further, in contrast to the ABC approach to the long-term variability of central 'fixed' costs, he stated:

"In costing each proposal, we also assume that all central expenses, such as central administrative, library and student facility expenditure, remain constant. It is considered that the expansion of student numbers involved in a single proposal is insufficient to incur any additional costs in these items".

So although activity-based average-cost allocations were considered as part of a range of allocation methods, the attitude to the use of these allocated costs was that generally they were not relevant to decision making.

Costing Issue: Joint costs

Bottomley raised a particular concern for the Bradford study, in that the convention at that university was that if academic staff were recruited to teach, then as an intrinsic part of their duties there was a requirement to also do research, so that: "since this research expenditure must be incurred then it should be regarded as part of the cost of undergraduate teaching". Bottomley (1976) also mentioned this as a possible concern in the context of a study of unit costs in French universities. Although this position was perhaps tenable at that time, and certainly complicates the costing issues, it now seems less of a concern, in the UK in the 1990's, with the move to separate funding of teaching and research, and the competitive forces that cause each type of programme to require cost-justification. While the intertwining of teaching with research was often seemingly justified on academic grounds, Jenkins and Gibbs (1995) stated that: "... research shows that excellent researchers are no more likely to be excellent teachers than are poor researchers. Teaching and research are largely unrelated domains directly competing for time and attention ...".

Costing Issues: Joint costs; Opportunity cost; Costing to influence behaviour; Costing for decision making

Sims (1973) explored the potential for management accounting in universities, in terms of providing information for decision making, and recommended an "activity accounting system". In this, Sims suggested that expenditures can be categorised and allocated (by school) to "primary activities" like undergraduate teaching, postgraduate teaching and research, and to "secondary activities" such as library and computer services. He pointed out that such allocations are by no means straightforward, particularly for the dominant cost of academic staff time. He suggested using an opportunity cost approach for buildings and equipment "to bring home to users the social cost of the facilities at their disposal, in the hope that increased efficiency in the use of those facilities will be encouraged". He also suggested that secondary activity costs can then be reallocated (to primary activities), for example computer costs by means of records of computer jobs processed, and library costs by means of the points system suggested by Bottomley. The purpose of all this was better information for decisions, for example the "explicit consideration of the allocation of resources between teaching and research".

Costing Issues: Exclusion of surplus capacity; Fixed, marginal and average cost

One might ask whether Sims was in fact describing an ABC implementation in all but name. The answer is that the allocations were often, where feasible, activity-based, although the level of detail was patchy (for example avoiding the allocation issue for central administrative functions), and that the ethos was also patchy. The determination of the balance between teaching and research is indeed a strategic 'product' issue, typical of ABC approaches, however Sims warned against using the methods for other 'product' decisions:

"Because there will often be under-used resources available such as faculty time and teaching space, and because new faculty members tend to be appointed towards the bottom of a salary scale, the 'marginal' cost of teaching additional students will often be lower than average cost, and it would therefore be misleading to use historic average cost information for decisions of this type."

The point concerning 'free' use of a temporarily under-used resource and that concerning staff starting at the bottom of the scales, run counter to the ABC argument, in that cost savings caused by short-term phenomena do not normally reflect the real long-term cost impact of decisions. Sims' views on the effectively zero cost of under-used resources are indeed at variance with his separately stated views that capital resources can be handled by opportunity costs - following his own latter logic, one would expect him to at least recommend consideration of the opportunity costs of the under-used resources, through consideration of alternative uses.

So in assessing what has been done in universities in terms of ABC, there is a need to verify that both the mechanics of ABC are being utilised, and also that the results are being treated as surrogates for the long-term cost relationships involved. As with Bottomley, Sims went only part-way towards these criteria. At Ohio State University (Young and Geason 1982), similar allocation systems had been implemented with considerable sophistication (even for example dealing with sharing of interest income) but again the ABC ethos was partially compromised in this case by relating allocations to fairness and ability to pay, rather than to establishing 'true' costs.

Costing Issue: Complements to unit costing; Costing for influencing external bodies

Although there is no published evidence of a widespread move towards unit costing (and in particular cost allocations), there were some instances like Bradford where in-depth work had been conducted. Weaver-Meyers et al. (1985) described a detailed costing of certain university library operations, which led to the identification of the cost of particular activities; this was a good example of an activity-based cost management exercise, which then led to process changes. Jones (1986) described a wider ranging study, in the Further Education (FE) sector, at North West Kent College of Technology. Although not an ABC implementation as such, this study was particularly useful in presenting the need for unit-costing of courses, in the context of the inadequacy of the standard efficiency measure Staff-Student Ratio (SSR). Jones demonstrated that the conventional treatment of part-time students seriously distorts the SSR, with consequent funding creating an artificial incentive to focus on full-time rather than part-time courses. He also pointed out that operating costs differ significantly between courses, yet this is not recognised in budgets or funding, or of course in the SSR measure itself.

Costing Issue: Costing for decision making

Coopers and Lybrand (C&L) (1987) (endorsed by the Department of Education and Science) reported on various investigations, and gave detailed guidance on course costing in FE. The allocation methods showed some sophistication, in some cases activity-based, so that the ABC allocation approach can be said to have been at least partially adopted, particularly in the context of a stronger emphasis on the use of average costs. However, while the report stated that "costing information is a powerful tool to assist management in sound decision making", there was little said about what these decisions might be. For example the decision to add/drop a course was not mentioned, other than as an implied aside "Account should also be separately taken of the marginal costs of running full-cost courses...". The report was in fact more concerned with overall course cost comparisons. So although the (partial) ABC data was there, there was no real guidance about its use

for product-related decisions.

From an ABC viewpoint, there was a further absence from the analysis. Because the primary objective was to develop approximate course costs, detailed allocation methods were only recommended for the larger cost components (ie. primarily staff costs). In particular, the following approximations were made for smaller costs:

- Non-teaching premises costs were not analysed at all, but simply allocated to courses in the same proportions as teaching space, and the opportunity cost of capital assets was not addressed.
- It was stated that central administration "can be apportioned to courses on a simple basis as it tends not to vary with courses themselves but with students and lecturers", thus missing the cost implications of course proliferation.
- Even though it was recognised that there were difficulties in assessing the impact of part-time students, it was suggested that allocation of many costs (including libraries) could be on the basis of student FTE's.

While these approximations did not invalidate the derived course costs, it did mean that the data was of no value in for example seeking efficiency improvements in use of non-teaching space, in central administration, or in the library. Similarly it made it impossible to compare the relative costs of part-time versus full-time students. In conclusion, the report's recommendations fell short of an ABC implementation in both allocation methods and in the full usage of the derived data.

Costing Issue: Costing for decision making

Birch (1988) referred extensively to the C&L report, in developing further guidance for colleges, and dealt similarly with cost allocations. Once again decision making was referred to as an area of application for costing methods, but the primary focus was on comparisons, rather than on decision making:

"Thus an apportionment of inputs to activities and programmes may ultimately be an arbitrary process. But this ... may not matter so long as we all ... measure, allocate and apportion the same things in the same way. If this is not done then comparisons across colleges or within colleges ... may be invalidated."

Costing Issue: Actions after the ABC exercise

One aspect where Birch did show a movement towards the ABC ethos was in his Appendix on costing terms, where he stated that the cost of an activity is viewed as the extent to which that activity is consuming resources. He also went further than C&L in considering the structure of library and other costs, suggesting for example that a flexible budget for the library might be based

on equations like:

$$\text{Budget} = 50,000 + 2 \times \text{FTE students} + 5 \times \text{FTE staff}$$

although he did not pursue this in terms of the use of information that might be derived from the allocation exercise.

Costing Issue: Costing for decision making

Port and Burke (1989) made an excellent case for using ABC for course costing in HE, in particular to support pricing decisions in response to the bidding process for undergraduates, introduced at that time by the UK government. They also cited the taking on of "industrial research contracts at prices which fail to cover the full costs involved", with a contributory cause being "the complete absence of reliable information on the full costs of research". They explained satisfactorily how ABC can be applied, although surprisingly they chose to restrict drivers to just staff (contact hours), students (FTE), and premises, stating: "Other factors such as courses are not considered to be cost drivers since the existence, or not, of a particular course has no direct effect on the costs of the institution". As the existence of a course (at least in this researcher's experience) involves course committees, course management, examination processes, external examiner fees, validation events and publicity material, it is surprising that Port and Burke dismissed this driver so readily! It has to be said therefore that the ABC implementation was perhaps somewhat simplistic.

Costing Issue: Actions after the ABC exercise

What distinguished this article from those considered earlier was not in fact the allocation processes, but the motivations for the exercise, and the guidance given on potential management usage, which were fully consistent with ABC approaches in other sectors. Port and Burke concluded with this list of potential benefits of ABC-based course costing:

- "Performance measurement: Identify non-value-added activities; Analyse trends in the cost of activities.
- Portfolio management: Know which courses are net contributors and which are receiving ... subsidy; Understand the impact of changes in the course delivery process; Know which market segments justify further investment.
- Pricing policy: Base price on meaningful course cost, whether marginal or full recovery; Understand the impact of discounts, course preparation costs, ... special facilities, etc.
- Strategic decisions: Identify scarce or high-cost resources; Recognise the cost of complexity; Ability to manage course proliferation; Use of cost drivers which take the business in the right direction"

All of these are valid, albeit that the last set seem at variance with the earlier exclusion of the number of courses as a driver.

Costing issue: Costing for influencing external bodies

While some practical experiments with ABC in HE were presumably taking place (not least through the consultancy efforts of Port and Burke), Doyle (1991) claimed to be "the first reported application of ABC methodology in higher education". Doyle's study at the University of Technology, Sydney, was specifically to determine the relative costs of teaching part-time versus full-time students. Doyle's institution had a large proportion of part-time students and considered it was disadvantaged by the funding formulae, so required evidence to support its claim. This was a clear case of requiring a 'true' cost, reflecting long-term resourcing and average costing, so ABC was perhaps not surprisingly proposed by all three consultancies tendering for this project.

The allocation of full-time academic staff costs (which as always were the dominant cost) was a difficulty because of the "diversity of activities undertaken", so "a faculty activity survey was developed and its results used as a critical component in the study". Varying levels of detail were applied. For example, in central administration, drivers were used for 'number of committee participants' and 'number of recruitments', whereas in the Library and Computer Services, the desired driver data was not available, so that estimates had to be made. The conclusion of the study was that a number of activities related more to the number of students than to the number of FTE's, and consequently the cost of educating a part-time student was significantly (44%) higher than the FTE variable would indicate. The ABC exercise was therefore regarded as a success, in providing evidence of the relative cost of part-time students.

While the exercise was a success in terms of its objectives, it would perhaps not be viewed as a comprehensive use of ABC, because of the approximations made. Although these approximations probably made little difference to the bottom-line 44% figure, they did mean that for example, nothing had been learned about potential efficiencies in the library or in computer services. All the same, this was clearly an effective use of ABC in the university context.

Costing Issue: ABC in cost management

Turk (1992) demonstrated how ABC can be used in (US) universities. He set the scene by pointing out that the late 1980's had seen pressures on pricing simultaneous with cost increases (both administrative and academic), so that there was now greater interest in cost information and costing methods. The interest was particularly in limiting the administrative cost base, and in limiting costly

drift of academic tasks (for example the proliferation of speciality courses). Turk reviewed traditional costing methods, which allocate central costs to schools using relatively simplistic methods (students, floor space, etc.), and then demonstrated how ABC can be used with the admissions function of a university, so as to refine the allocation process (differentiating the marketing/ applications activities from those concerned with registration of accepted students). Turk pointed out that with the ABC information, not only is there a truer picture of allocations to schools, but there is also information that enables us to examine possible improvements in efficiency in the central department. For example, in admissions, actions can be assessed like changing the work flow, automating manual activities, and eliminating the causes of error and rework.

Costing Issue: Costing for decision making

Turk made an important point about the applicability of ABC in the university context, in stating that for certain purposes ABC was perhaps unnecessary:

"Institutions will need to determine the costs and benefit of the more complex and costly ABC approach. If the purpose of cost allocation is to ascertain the revenue and cost of each school and department in order to analyse school financial performance and the resulting contribution to overhead, the traditional method may suffice."

He concluded however that "if the costing system is used to determine tuition and fee prices" or for performance measurement, then ABC does have clear relevance.

Turk's ideas were followed up in Acton and Cotton (1997), both for the admissions function and the library service of a US university. Although Acton and Cotton discussed cost management issues, the focus was on allocation of costs to schools, and thence to a cost per enrolled student. Some of the methods were thus insufficiently detailed for further cost analysis, for example there was no distinction made between different courses or types of student in determining allocations. The costs also seem to have been forced onto convenient (and available) transaction bases, rather than to have been considered as to what really drove the cost. For example, more than half of the admissions budget (for marketing/ recruitment) was allocated according to the benefit derived (enquiries generated) rather than on what drove the expenditures, so one might presume that popular courses with little promotion were subsidising heavily promoted unpopular courses. Consequently, the suggested use of the results of this allocation to re-assign promotional effort is potentially counter-productive. Acton and Cotton thus achieved some 'better' allocation of service costs to schools, but gave little information (or even misinformation) for cost management, as well as no information relative to course or student diversity within schools.

A conference 'Management Accounting in Universities', organised by CIMA in December 1992, covered several topics relating to cost allocations. The resulting papers were published in Berry (1994), and included reference to ABC in Scapens et al. (1994), Groves et al. (1994) and Burnett et al. (1994).

Scapens et al. (1994), relating experience at the University of Manchester, stated that in considering approaches to overhead recovery: "Initially, the working party looked at the concepts of activity-based costing ...". However a strong requirement emerged that "the system to be developed would have to be simple, both to understand and to implement. ... Consequently, the allocation model which was developed is not an activity-based costing system as such, rather it is an application of some simple concepts of overhead allocation based on cost drivers." (These were students, staff and premises space).

Costing issue: Costing to influence behaviour

While this appears to be a vote against ABC, it should be noted that the purpose at Manchester was simply to provide a rational allocation of income and expenditures to resource centres in place of preserving historical allocations, so as "to give resource centres more control over their own affairs and incentives to generate new income". So the evidence from Manchester (consistent with Turk's advice) is not that ABC is an unsuitable method per se, but that it may be unsuitable for their specific purpose.

Costing Issue: Behavioural consequences of the ABC exercise

In fact, one aspect of Manchester's design was that through the charging for premises, they anticipated some release of space which they suspected was being under-utilised. This result was indeed achieved, but with an undesired side-effect, in that some of the space released was not usable for central allocation to other users (eg. isolated small rooms without easy access), so that some restrictions had to be imposed on space released.

Costing Issue: Selection of drivers; Acceptance v. applicability

Groves et al. (1994), referring to the University of Wales College of Cardiff, described a proposal to implement ABC. As in all university costing exercises, the major operating cost was of academic staff, which was difficult to apportion to academic activities. Ultimately this was resolved by requesting staff to estimate (each quarter retrospectively) how much time was spent on each activity. Although the term ABC was used, and reference made to ABC literature, it would appear that at the earliest stage reported, the analysis fell short of the ABC norm. For example library and computer

services costs appear to have been apportioned directly to academic activities (like undergraduate teaching) rather than to the activities of the service functions themselves, through specialised drivers. This paper does not therefore add to knowledge of specifically ABC issues, however as with Manchester, it is evidence that ABC is not a high priority for a university attempting its first phase of allocation methodology.

Costing Issue: ABC in cost management

Burnett et al. (1994) described a course costing system at Leeds Metropolitan University. This non-ABC system seemed to work satisfactorily enough, but Burnett et al. identified a problem with identifying and controlling overheads that remained unaddressed.

Costing Issues: Devolved decision making; Acceptance v. applicability

Also in Berry (1994) was Bourn (1994), which outlined the processes by which universities were proceeding to further devolve decision making to schools, with particular reference to work at Southampton University. At Southampton, as with Manchester, an initially complex allocation system (of 22 drivers) was eventually reduced to the same three drivers (students, staff and premises space). Bourn's approach was novel in that he presented the move to allocation systems in the context of devolution, in that while Southampton and similar universities were stable (and the equally stable costs/ revenues were controlled centrally), then the interest in allocations did not arise, but as devolution proceeded (in response to external pressures), then allocation systems became more useful. The lesson of Southampton and Manchester was that, at their current levels of devolution, quite simple allocation systems met the new needs, and that the complexity of ABC was not required.

Costing issue: Costing to influence behaviour

Carr (1994), published by the Certified Accountants Educational Trust, made a strong case for the use of ABC:

"This is a fundamental shift away from a generalised apportionment model using FTE staff or FTE student and can assist in identifying cross subsidisation across course areas."

"Attaching a cost to an activity raises the awareness level of users as to the price and value of that activity. This in turn changes users' behaviour leading to a better use of the resource or better design of courses so that they minimise the use of the activity related resource."

He followed this with an example of how ABC could be applied to student admissions costs, thus revealing cost implications of courses with a high ratio of applications to admissions.

Costing Issue: Costing for decision making

However, Carr's primary focus seemed to be to set a standardised approach to making use of

existing financial information for comparisons and pricing decisions. This showed also in Carr's careful terminology, using 'allocation' as a process of identifying and separating costs, and 'apportionment' as a process of re-allocation of these costs using rates or cost drivers; both 'allocation' and 'apportionment' thus apparently included idle capacity, and excluded the use of projected costs.

Costing Issue: Costing for decision making

Carr also mentioned some of the complexities of course costing (for example the step function nature of staffing needs relative to cohort size, and the random nature of student choice of options), but he did not position ABC in this discussion. Similarly in describing the process of budgeting for academic centres, he included the comment: "Apportioned costs are not however controllable by academic budget holders and should not form part of their individual budget targets". This again missed an opportunity to encompass ABC. Carr was enthusiastic to apportion greater costs to courses where the application/ admissions ratio was high, yet appeared to take the opposite view when apportioning to the school that controls the course. So, in all, although Carr advised the use of ABC, the detail of much of his advice ran counter to aspects of ABC methodology.

Costing Issue: Acceptance v. applicability

Carr presented no empirical evidence in support of the normative advice on ABC, thus there was no counter to the papers from Berry (1994) which showed that in practical circumstances, ABC had not been a high priority. Indeed, JFC (1997) presented the results of a survey of HEI's which showed that while institutions attached great importance to costing information, "responses show that the cultural environment, acceptance by academic departments, and resource requirements for implementation are more important than a textbook approach to costing". This need for 'acceptance' was emphasised by Hardy (1991) who argued that the decentralised nature of universities was such that for the implementation of strategy, "success will depend on the skilful use of power as much as objective analysis".

In its guidance to UK HEI's, JFC (1997) firmly embraced the resource-activity-output paradigm, and the use of activity analysis in particular to identify cost drivers. This was clearly an ABC focus, but with some variations from what might be seen as conventional ABC wisdom.

Costing issue: Selection of drivers

JFC suggested selecting drivers on the basis "best suited for allocating the pool of costs to cost objectives, according to either the benefits derived or a traceable cause and effect relationship". The

suggestion to base allocations on benefit derived was of course not consistent with the ABC approach.

Costing issue: External financial reporting

JFC stated that the cost estimation methods for pricing should be "consistent with the accounting practices used in accumulating and reporting historical cost", and that "a costing exercise should include all the costs and activities of an institution and be reconciled to the institution's main financial or statistical records". While one might sympathise with the motivations for this, in the avoidance of double counting or accidental omission of costs, this of course was again at variance with ABC 'good practice' which identifies the need for separation from formal financial systems. This link to financial reporting presumably explains why JFC considered ABC as a 'full costing' method, and why 'fixed' costs were accepted as such without discussion of their longer-term variability.

Costing issue: Costing for influencing external bodies

An issue raised by JFC was the "need to provide an audit trail for certain sponsors" of research projects, which was used as further justification for the link to financial statements. Similarly, revalued asset figures for buildings (rather than historical cost) were said to be "a greater bargaining lever when negotiating with commercial companies". There is a dilemma here in that for internal decision making it is useful to know the 'true' costs (perhaps utilising ABC), yet for negotiation with funding providers it may be advisable to choose other costing systems that create cost figures to support this negotiation. It is of course problematic if cost systems are created for the latter purpose, but then are used for a different purpose (internal decision making); JFC did not comment on this problem.

Costing issue: Opportunity cost

JFC did suggest the use of opportunity cost in decision making, with the example given of considering rental sacrifice when converting student accommodation to office space. However, this was an aside, and was not included in the main costing examples, for example as a means of valuing all premises space. Presumably this again was a consequence of the stated desire to reconcile with financial accounts.

Costing issue: Joint costs

JFC did give considerable advice on separating out the two major joint costs of academic staffing and premises usage, by using time-sheets, surveys and usage records. The separation suggested was

initially into the main academic activities of teaching, research, administration, and other services (eg. consultancy), which was followed by more detailed analysis. It seems to represent good practice for full costing, albeit that it ignored issues like idle capacity and valuation of different types of space.

Costing issue: Costing to influence behaviour

JFC's product costing decision examples, taken at school level, took into account all institutional costs. However, one might suspect that in reality schools may have greater concern for their own costs than those of the rest of the institution. This was mentioned as an issue (relative to devolution to schools) by Holmberg and Bradshaw (1993), and was indeed recognised by JFC in its mention of the manipulation of top-slicing as a means by which institutions provide incentive to schools, for example to generate research income. The possible behavioural effect on product decisions at school level was however not considered by JFC.

JFC (1997) thus provided what might be seen as the current consensus advice to UK universities on how to conduct costing exercises. It certainly included ABC as a method, and it focused strongly on average costing rather than short-term marginal costing, with good advice on issues like joint costs. However, it did suffer from certain weaknesses, relative to current thinking concerning the application of ABC methods:

- It constrained the analysis to be linked to the financial accounting systems, whereas even the earliest proponents of ABC made clear that this was not appropriate.
- It ignored issues like idle capacity, resource scarcity (and its opportunity cost), the long-term variability of 'fixed' cost, and the possible lack of relevance of historic/ current cost to decision making.
- In the illustrative examples, it was at a very broad level, for example mixing very different and complex activities into a single pool with one cost driver. JFC did emphasise that the examples can be developed into greater detail as needed, however there was no warning about the dangers of misapplying the summary level information in the absence of such detailed analysis.
- The emphasis throughout was on ascribing institutional costs to schools and thence to products for pricing and product-mix decisions, and there was little attention to cost management, process design and product design.
- The product costing examples loaded indirect costs onto direct academic labour using rates well in excess of 100%. This was the type of practice that of course led to the 'loss of relevance' debate in industry, when applied to a set of non-homogeneous products.
- There was no explicit consideration of the behavioural response of schools to the allocations, as

to their taking a school or product view influenced not by the real institutional costs but by those passed on to schools via top-slicing or standardised charges and allocations.

In conclusion, current normative advice concerning ABC in UK universities is inconsistent with agreed ABC good practice, and is incomplete in failing to properly relate to the purposes of the costing exercise. There is little documented usage of ABC in this context, although there is some empirical evidence that ABC can be effectively used for specific purposes. The literature relating to ABC in universities has identified the following:

- Activity-based average-cost allocation methods have been used for decades, but their use has been primarily for comparisons and allocations of resources to schools, and has largely excluded decision making. In particular, there has been no long-run ABC 'ethos' in treating 'fixed' costs as largely controllable (and variable), and the level of detail has been generally insufficient for product design or cost management of processes.
- ABC has to be complemented with other methods to deal with the joint costs of academic staffing and premises usage, for example based on time-sheet records or surveys. There is no consensus on the detail of these methods, for example in addressing different types of staff workload, and different types of premises space.
- For the purpose of allocating overall central costs (and resources) to schools, the consensus seems to be that ABC is unnecessarily complex, and that simple single-base allocations (especially on student FTE's, academic staff FTE's, and premises space) are sufficient.
- For the purpose of product costing, there is recognition of a weakness in calculating overheads (eg. for research contracts), which has raised interest in ABC, but that the empirical consensus is again (like school allocations) that simpler allocation systems are sufficient.
- For the purpose of cost management, normative advice on the use of ABC has been given, but there is almost no published empirical evidence of its use. There seems to be a general failure to understand (and warn) that if the detail of the ABC approach to allocations (eg. to schools) is compromised by approximations, then the use of the data for cost management may be invalid. In fact in Acton and Cotton (1997), the methods have been further compromised, by allocating on the basis of benefit derived rather than on drivers of cost, so that subsequent cost management exercises may even have been counter-productive.
- In special exercises, ABC has been successfully used to investigate the relative cost of part-time v. full-time students so as to support funding arguments.
- Devolution to schools appears to be accompanied by greater interest in cost allocations, but at current levels of devolution this interest falls short of the complexities of ABC.
- An important cost goal is the efficient use of premises, yet there are problems of valuation and of

allocation. Opportunity costing has been suggested as a suitable approach to the valuation problem, consistent with the ABC 'ethos'. However there is evidence that basing simple allocation methods on desired behavioural effects is perhaps a more effective guiding principle than seeking to establish 'true' costs using methods like ABC.

- Universities appear concerned about allocating (to schools) those costs which they see as not controllable by school management, but failing to note that the allocation base (if properly reflecting cause-effect) may indeed be controllable (eg. the balance between different types of student).
- There is evidently a consideration that ABC has a role in influencing external funding bodies (eg. as to the treatment of overheads in research contracts), but not a recognition that this might compromise its use for internal management purposes.
- Normative advice on ABC in universities has involved (contrary to general recommended ABC practice):
 - an adherence to the allocation of current (even temporary) costs rather than projected costs,
 - enforcing a link to the financial accounts,
 - allocating partly on bases that do not reflect cause/effect relationships (eg. for convenience, or on the basis of benefit derived),
 - a failure generally to address the heterogeneous nature of courses within schools (eg. different subjects),
 - a failure generally to address the cost impact of different modes of study (ie. continuing to use FTE students as a base),
 - a failure to consider that although most 'fixed' costs are ultimately controllable and variable, there can be costs which are truly fixed in the long term.
 - a lack of consideration of ABC's role in assessing the cost of complexity, in particular course proliferation and course design complexity.
- There has generally been a failure to consider the behaviour of school (and department) management in their decision making, where cost consequences for the school differ from those for the university. The literature appears to assume that all decisions are taken with a central university perspective.

2.5 Conclusion to the literature review

This literature review commenced with an examination of traditional cost allocation methods, and complexities like joint costs, and then moved on to some key debates about cost allocation, before examining ABC. The development of ABC has been followed from its manufacturing origins, through applications in services and public sector organisations, and finally to applications in the university context. Little has been written about ABC in the latter context, but what has emerged is a general enthusiasm for the principles, with some normative (albeit largely simplistic and incomplete) advice, and some early experiments, yet relatively little empirical evidence of its thorough application.

The most recent governmental guidance on costing for UK universities (JFC 1997) makes use of ABC concepts but is limited to restatement of financial accounting information so that the full capabilities of ABC are not enabled. The evident goal for this guidance is to move institutions forward from a position of little competence in costing to one in which some minimal level of competence is attained in the assessment of school and product cost. The link to financial accounting information is the means of ensuring that this competence is verifiable as having been achieved. However, for institutions already at this level (or those that achieve this level in future), the guidance says little about using the full capability of ABC. In this final section of the literature review, are gathered together the various costing issues, from the different sections of literature reviewed, potentially associated with an extension of the use of ABC in universities beyond the apparent limitations of current competence and practice.

2.5.1 Development of Themes and Issues

A large number of issues (more than 40) were identified, in the various sections of the literature, that appeared to have relevance to a discussion of ABC in HE.

To move forward with the research, some categorisation was needed, so as to give a clearer basis for survey design and for subsequent stages. Miles and Huberman (1994) emphasised the importance of developing coding systems that are structured into broad categories or 'pattern codes', as an important means of initial data analysis of field notes containing qualitative data. A similar viewpoint would seem to be valid in this research, in dealing with the literature review, and in translating it into a framework for further analysis. The review raised a large number of issues,

many of which recurred in different stages of the review. In effect, the title of each issue is a 'code', but overall there was the problem of a set of codes without structure. Therefore, an important first step was to develop such a structure. The practical means of carrying out this structuring was to prepare a brief note on each, and then to arrange, and iteratively re-arrange, these notes into small related groupings and finally into larger groupings. By this means, the overall set of issues was categorised into a set of major 'themes'.

It became apparent from the initial grouping that some issues were duplicates/ complements of others (eg. 'variable cost', 'average cost' and 'fixed cost' issues), and that some others were readily generalisable into broader issues (eg. 'product pricing' and 'product mix decisions' could be seen as aspects of a broader 'costing for decision making'). In this process therefore, the number of issues was reduced.

A high level categorisation was apparent from these groupings of issues, in that some issues were evidently of a practical 'implementation' nature, while others were conceptual. The initial categorisation that was attempted was thus:

1. Background and justification for the ABC exercise.
2. Practical implementation issues.
3. The use made of the results from the exercise.

The following problems arose however with this categorisation:

- The justification of carrying out an exercise was partly concerned with the specific purposes behind the exercise, however the contextual influences could influence costing choices even for a specific purpose.
- The justification for an exercise was complicated by the wide range of alternatives or complements to ABC.
- The practical implementation issues formed too broad a category, in terms of focusing later analysis.
- The issues relating to use of the results overlapped the issues relating to the justification of the exercise.

These problems were addressed by dividing the 'Background and justification' into three categories (themes 1, 2 and 6 below), by dividing the 'Practical implementation' into two (themes 3 and 4), and by refocusing the 'Uses of results' into the consequences of an exercise, as distinct from the purposes (theme 5).

The resulting categories or 'themes' were thus:

1. The HE context for ABC

Costing systems are dependent on the context, relative to both the external environment and the internal organisation and structure. Under certain conditions, ABC can be appropriate as a costing approach, and the uniqueness of context of a university may or may not satisfy these conditions.

2. The purposes of cost allocation

Specific cost allocation methods like ABC can only be judged as effective or appropriate if related to the desired purpose of the allocation. Purposes range from external financial reporting to internal decision making, and each may give rise to different costing approaches with differing use of ABC methods.

3. The costs to include in the analysis

ABC allocations will only have their maximum value if the costs that are allocated are appropriately chosen and measured. In particular issues of joint and fixed cost have to be resolved, and also time-related cost issues like the treatment of capital employed.

4. Carrying out the ABC exercise

The core tasks of an ABC exercise, with a level of detail dependent on the purpose, are to identify activities, cost drivers for these activities, and the cost objects to which allocations are made.

5. Consequences of the ABC exercise

Following an ABC exercise, costs will be derived and applied according to the original purpose. However, the consequences of an exercise may go beyond this to include benefits, problems and various action alternatives. In particular there may be unintended behavioural consequences.

6. Alternatives and complements to ABC

Some methods (eg. opportunity costing, and non-financial measures) can be seen as complementary or alternative to ABC. Some alternative methods are radically distinct from the ABC approach, in particular the choice of allocations to influence behaviour rather than to represent a true picture of costs.

The themes are largely separable, but there are inevitably some areas of overlap. In particular, behavioural issues arise as a purpose for cost allocation, as a consequence of ABC exercises and also as a key alternative approach to ABC. Also opportunity costing (eg. of premises) is an important complement to ABC, but also forms part of the discussion as to which costs should be included in the ABC analysis. This type of overlap will occur whatever the chosen categorisation, but the chosen themes keep this overlap to a reasonable level. There is no 'best' categorisation, and indeed no 'best' set of issue descriptors. The selected themes and issues simply form one of many possible categorisations that would be suitable for the purpose here, ie. that of defining a framework for empirical data collection and development of the overall subject.

In the text that follows, these themes are briefly summarised, with subsidiary costing issues shown in italics (as raised in the literature review). This set of themes and issues establishes the base within which further aspects of the method are explored, in particular the first stage of data collection, involving the design of the survey questionnaire.

2.5.2 Theme 1: The HE Context for ABC

Costing issue: Acceptance v. applicability

Positive Accounting Theory suggests that important lessons for theory may arise in investigating why methods that are thought to be applicable, and the subject of normative advice, are not accepted in practice. ABC has received acceptance in certain contexts (both manufacturing and services) but acceptance has been slower in other contexts (eg. the UK National Health service), and has been fragmentary so far in UK universities. The latter lack of progress with ABC may in some cases be a result of lack of knowledge or competence, but there are documented situations (eg. Bourn 1994) where the knowledge was clearly available but a judgement was made to use relatively simple allocation systems rather than ABC. The lack of progress contrasts with the apparent enthusiasm for the ABC concept (and cost allocations generally), in particular in response to funding pressures and to increasing devolution to schools.

Costing Issue: The influence of context

In fact, Belkaoui (1989) warned us that the appropriateness of accounting systems depends on the organisational context, and it has been noted that differences in context (including organisation, technology and environment) have indeed led to different costing systems. The literature shows that each industry context can bring a unique set of issues to cost allocation:

Industry Context	Issues
Railways	Minimal direct cost; Cost caused by past activity.
Telecommunications	Minimal direct cost; Many joint costs; Need for accurate costs in monopoly market.
Financial services	Many costs associate with product groupings.
Computer services	Carrying costs of unbilled work; Separation of customer acquisition from servicing costs.
Charities	Valuing the time of volunteer staff; Maximising benefit from limited fund-raising resources.
Healthcare	Public-service non-profit culture; Quasi-markets (purchasers and providers) in the NHS.

From these examples, and from other parts of the literature, the following generic contexts can be considered, all of which have some relationship to the operation of publicly-funded UK universities.

Generic Context	Issues
Services	Many joint costs apply; Service cannot be inventoried; Output is often a 'package' of benefits (speed, quality, etc.); Costs may be associated with product groups.
Public sector	External concerns (about cross-subsidisation) necessitate cost allocations; Economy and effectiveness are as important as efficiency.
Not-for-profit organisations	There is a need for sensitivity in applying costing methods; There is a need for opportunity costing of limited/ constrained resources where resources are acquired below real cost levels.
Devolved organisations	Devolution into 'free-market' interacting components lessens the need for allocations (replacing them with negotiated charges).

UK universities share aspects of all these generic contexts, but overall do appear to be unique in terms of organisation, technology, markets and environment, therefore one would anticipate the possibility of a need for a unique set of costing systems, and in particular a distinct role for ABC. The diversity of product range, and the growth of indirect costs in universities are factors suggesting a possible role for ABC, however this is in the context of a level of direct (academic) labour that remains high compared to the 'traditional' ABC contexts.

2.5.3 Theme 2: The Purposes of Cost Allocation

Specific cost allocation methods like ABC can only be judged as effective or appropriate if related to the desired purpose of cost allocation. These key purposes arose in the literature:

- External financial reporting.
- Costing for influencing external bodies.
- Costing for decision-making.
- Cost management, and strategic cost management.
- Influencing behaviour.

Costing Issue: External financial reporting

This reporting may be for statutory or similar requirements. For financial reporting purposes, the costing and allocation methods are largely externally imposed, and are dominated by the requirements of standardisation and auditability, whether or not the results are useful for management purposes.

Costing Issue: Costing for influencing external bodies

For universities, public sector organisations, and regulated monopoly organisations, methods used for costing internally may be open to scrutiny by external bodies, in particular to prevent cross-subsidisation. For universities the external bodies are generally those involved in providing funds. All costing systems involve choices as to methods, and it is evident that these choices will be directed to support positions taken with the external bodies.

Costing Issue: Costing for decision making

The stimulus for ABC was to develop product costs to support pricing and product mix decisions, and it was also realised that the ABC information could be used for decisions associated with product design. On an organisational level, across divisions and departments, the ABC information identified broad patterns in the consumption of resources and services, as well as areas of cross-subsidisation, and thus supported operational decisions concerning the efficient deployment of resources, and the establishment of budgets.

Costing Issue: ABC in cost management

While the earliest use of ABC was driven by product decision making, ABC's role in cost management is now equally important in the literature. This includes gaining insights into process

efficiencies, leading to process re-design, and reduction of waste.

Costing Issue: Development of strategy

ABC and activity analysis are complementary to approaches like value chain analysis and business process re-engineering, and support strategic decision making involving for example markets served and types of product supplied.

Costing Issue: Costing to influence behaviour

A final point concerns the use of costing methods to achieve a desired behavioural effect. Whereas ABC and most allocation methods are constrained to use real or projected cost bases (however defined) and attempt to give some 'true' picture of overall cost, behaviourally based allocations suffer no such constraint. Dugdale (1990a) concluded that this was the one approach which was difficult to reconcile with other approaches. This purpose has been included within this theme, but it has also been included within theme 6, where it is treated as a key alternative approach to ABC.

Some additional points that arose in the literature, relating to the purposes for ABC in universities are:

- For management purposes, there is a need for specially designed costing systems, and the external financial reporting system is generally not suitable for these purposes. However, normative advice for universities has generally been to link allocations to the costs recorded in the financial accounts.
- There is evidently a consideration that ABC has a role in influencing external funding bodies (eg. as to the treatment of overheads in research contracts, and as to the relative cost of part-time v. full-time students), but not a recognition that this might compromise its use for internal management purposes.
- Activity-based average-cost allocation methods have been used (and advised) in universities primarily for comparisons and decisions on allocations of resources to schools, but have largely excluded decision making. In particular, 'fixed' costs have often been treated as non-controllable..
- ABC is often not appropriate for short-term decision making (ie. where there are no long-term implications of the decision), where alternative methods are available, for example focusing on current resource constraints/ surpluses and bottlenecks, and taking a marginal or 'decision-relevant' approach.
- For decisions with long-term impact (and it is argued that the majority of decisions are of this nature) it is the long-term cost structure that matters, and the demand placed on future resources,

the supply of which can be matched to demand by subsequent management action. The key to ABC allocations for management purposes is matching cause to long-term effect.

- ABC can be viewed as 'best practice' in applying average costing to long-term decision making. Even where the overall expenditure on (or provision of) resources is not increased to match demands, average costing for decision making has theoretical support in that it serves as a proxy for the opportunity cost of degraded service caused by increased sharing of a fixed resource.
- For decisions on allocating overall central costs (and resources) to schools, the consensus seems to be that ABC is unnecessarily complex, and that simple single-base allocations are sufficient.
- For the purpose of product costing, the empirical consensus is again (like school allocations) that simpler allocation systems are sufficient.
- ABC is important for product design and for cost management of processes, and there has been some normative advice on the latter in universities, however there has been insufficient detail in most empirical exercises to support these purposes.
- ABC can highlight the cost of complexity as a strategic driver, yet in universities there has been a lack of consideration of this role for ABC in particular relative to course proliferation and course design.
- Business organisations can gain greater strategic advantage by using ABC to support process changes rather than product changes (which are more easily copied by competitors). The literature of university costing does not appear to have considered this aspect.

2.5.4 Theme 3: The Costs to Include in the Analysis

In considering what costs should or should not be included in the ABC analysis, it is evidently only worth the fine detail of ABC if the costs that are allocated are appropriately chosen and measured. One clearly should not ignore important areas of cost and equally should not include irrelevant areas. Several challenges present themselves:

Joint costs and fixed costs

Costing Issue: Joint costs

Joint costs are a concern with all allocations, and decisions on separation of joint costs will of course impact the consequent ABC calculations. In universities the largest cost items, premises and academic staff, both involve joint costs.

Costing Issue: Fixed, marginal and average cost

There needs to be clarity as to the definition of 'fixed' cost, particularly in light of the traditional ABC viewpoint that in the long term all costs are variable. Even accepting the long-term variability

of all costs, marginal cost still has to be differentiated from average cost when the cost functions are non-linear, for example where there are economies of scale.

Time-related cost issues

Costing Issue: Currency of information

A concern with all costing is outdated information. For example for strategic cost management, anticipated costs should be used rather than historical or even current costs, and certainly 'sunk' costs would not be included unless they are representative of some future category of cost.

Costing Issue: Exclusion of surplus capacity

The exclusion of idle or surplus capacity can be justified, if it is truly surplus and unused (and thus a short-term phenomenon), and not that which is necessary to cover normal fluctuations and risks.

Costing Issue: Capital employed

Capital expenditure has to be allocated to periods in some way, opening up various side-issues of depreciation, inflation, and loan interest. There may of course be land and premises whose value appreciates rather than depreciates, and there may even be a form of 'negative' capital employed associated with revenues received in advance of the incurrence of costs. Opportunity costing of premises provides an alternative approach to issues like depreciation, which is considered further in theme 6. Without a constraint to match financial reporting needs, there is freedom to choose the methods that seem most relevant to the purpose, including for example the capitalising rather than expensing of long-term investment like staff training and curriculum development.

Costing Issue: Restricted view of product cost

For product costing it may be advisable to avoid a restricted view of product cost, for example by looking upstream and downstream in terms of defining the full product on offer to the customer. The upstream aspects (eg. curriculum development) are considered within the 'capital employed' issue, but a number of other aspects bear consideration (eg. careers services).

Some additional points that arose in the literature, relating to the costs to include in an ABC analysis in a university are:

- The allocation of joint costs involves arbitrariness, and this is a particular issue for academic staff costs and premises costs. Jointness in costs can arise in ABC in both the cost-activity and the activity-product relationships.
- 'Fixed' costs should generally be viewed as controllable in the long term, and varying, not with output volume, but with the actions taken by management, in particular product decisions.

- ABC as generally applied ignores the fact that some costs are truly fixed even in a long-term perspective. Normative advice for universities also fails to consider this possibility.
- Basic research and development expenditure that cannot be linked directly to any drivers should be excluded from allocations.
- ABC should use anticipated future costs, rather than historic or current costs, unless these reflect future costs. However, normative advice for universities has failed to advise of this aspect.
- ABC product costs need to be based on allocations of costs as they *will* be, following cost management exercises, rather than costs as they currently exist.
- ABC analysis needs to take account of future/ intended strategy (eg. on breadth of product range) rather than current strategy.
- Idle capacity that is temporary and has no relationship to long-term operation should be excluded as a cost. However, where it is a necessary consequence of normal business activity (eg. required to cover variation in workload volumes), then it should be included.
- The multi-period allocation of capital expenditure involves arbitrariness.
- Working capital costs (or benefits) arising from differences in timing between expenditure and income should be included in the costing process.
- Expenditures (like training) that provide multi-period benefit should not, in management cost systems, be charged wholly to the current period.
- In product costing, ABC needs to embrace all costs from product development and marketing to after-sales customer service, and avoid a focus simply on production/ delivery cost.

2.5.5 Theme 4: Carrying out the ABC Exercise

The core task of an ABC exercise is the selection of allocation methods that represent the relationship between expenditures on services and resources, through activities, to the drivers of these activities.

Costing Issue: Selection of drivers

In the ABC exercise, an objective is to identify the drivers that are most closely linked to resulting activity levels, thus creating demand on services and resources, and ultimately the need for long-term expenditure levels. The selection of drivers is often from a larger set of candidates, and has to be to a level of detail appropriate to the objectives of the exercise.

Costing Issue: Selection of cost objects

The selection of cost objects onto which costs are allocated is not straightforward. Traditionally in ABC, the ultimate cost object onto which other costs are allocated is product, but there are choices relating to intermediate objects. Where there are several stages of allocation, there is a risk that information at product level may then be too aggregated to represent the overall cause-effect sequence. Whereas most (ultimate) attention is on product cost, there may also be interest in the costing of customers and channels of distribution, and in both cases, a hierarchy of cost objects is possible.

Some additional points that arose in the literature, relating to the process of carrying out an ABC exercise in a university are:

- ABC treats overhead costs as being separable into 'pools', each of which is then allocated as if proportionally related to the driver volumes. Drivers should be based on cause-effect relationships, however normative advice for universities has sometimes suggested otherwise (eg. for convenience, or on the basis of benefit derived).
- Allocation of service department costs needs special treatment where reciprocal services are provided. Normative advice to universities generally advises simplified (and approximate) stepwise approaches; this is probably reasonable given the relatively low levels of reciprocal services, at least for product and school costing.
- The more drivers that are used, the more complex and costly is the ABC exercise, so that a balance has to be found between the anticipated benefits and these costs.
- While a large number of drivers is possible, organisations seem to have met most of their product costing objectives with about ten drivers, and some organisations have achieved significant benefits with just one additional driver.
- Numbers of transactions are a convenient proxy for more complex measures of transaction workload, provided the variation of workload between transactions is limited. Where there is such variation, weightings can be used (student FTE's are of course in common use as a base, unfortunately not generally verifying that the implied weightings are appropriate for the purpose).
- It may be possible to use statistical regression analysis to determine an appropriate set of drivers where alternatives are possible, as well as to detect non-proportionality in a relationship.
- The ultimate cost objects in university practice are usually products. Normative advice for universities has generally failed to address either the heterogeneous nature of courses within schools (eg. different subjects), or the cost impact of different modes of study (ie. continuing to use FTE students as a base).

- In practice (and in normative advice) in universities, allocations generally use schools as intermediate cost objects, and do lose detail in onward allocation to product.
- Although ABC can be applied in universities to cost objects other than products (eg. customers), this is generally not considered in practice or indeed in normative advice.

2.5.6 Theme 5: Consequences of the ABC exercise

An ABC exercise may have consequences beyond its original purpose in terms of behavioural effects and alternatives for action.

Costing Issue: Behavioural consequences of the ABC exercise

The ABC exercise itself and the subsequent usage of activity-based cost information can lead to behavioural consequences, some of which are beneficial (in particular increased awareness of cost) but some of which may be dysfunctional.

Costing Issue: Actions after the ABC exercise

There are many possible actions that may occur after an ABC exercise, for example changing product mix, changing business processes, or creating flexible budgets. There are concerns about the choice and sequencing of these actions. There are also concerns that if demands on resources are reduced by these actions, whether management then acts to re-deploy or reduce these resources.

Some additional points that arose in the literature, relating to these consequences, are:

- Cost allocations have behavioural effects, and the design of management accounting (including ABC) systems must take account of these effects.
- ABC exercises have improved cost-awareness in organisations, and the understanding of the real causes of cost. However, the ABC design needs to anticipate possible dysfunctional behaviour arising from allocations, particularly if used for performance measurement.
- Accurate ABC costs may not be appropriate for implementing strategy, because of their lack of focus on behavioural impact (eg. learning and motivation), and their complexity.
- ABC's role is clearly in terms of the long-term demands made on resources, yet it seems the concept is sufficiently complex so as to lead to its mistaken application in short-term scenarios.
- There has generally been a failure to consider the behaviour of school (and department) management in their decision making, where cost consequences for the school differ from those for the university. The literature appears to assume that all decisions are taken with a central

university perspective.

- Many actions are possible resulting from the ABC information. However the *sequencing* of actions is important. In particular, ABC may reveal the possibility of process and product changes which in consequence change the cost structures, so as to invalidate an initial view on product mix decisions.
- There seems to be a general failure to understand (and warn) that if the detail of the ABC approach to allocations in universities (eg. to schools) is compromised by approximations or by use of non-driver bases, then the use of the data for cost management may be invalid or even counter-productive.
- It is difficult to quantify the benefits of ABC from empirical results, because of other concurrent actions and business changes, so its justification has to be partly based on theoretical reasoning.
- Universities appear concerned about allocating (to schools) those costs which they see as not controllable by school management, but failing to note that the allocation base (if properly reflecting cause-effect) may indeed be controllable (eg. the balance between different types of student) through school decisions.

2.5.7 Theme 6: Alternatives and Complements to ABC

ABC can reasonably be considered as 'best practice' for long-run average costing, and its value can be improved by a number of complementary approaches. There are however alternative approaches to the philosophy of seeking 'true' costs.

Costing Issue: Complements to unit costing

Within the university context, ABC addresses efficiency in the use of resources, but also important are economy in the acquisition of resources, and effectiveness of the final output, both of which are measurable, for example: cost per staff hour, and graduate employment rate. The importance of non-financial measures for control purposes has been stressed in the literature, as leading to long-term financial benefit; in a university these measures might include, for example, staff-student ratio (SSR), quality ratings, and undergraduate completion rates. The market-driven approach to costs, which starts with a target market price, can utilise the activity analysis to put pressure on process and product design to achieve this price.

Costing Issue: Opportunity costing

Opportunity costing is appropriate when output is constrained by a limited resource, or the resource has an alternative external use or an alternative external supply. This evidently applies to university

premises, but may also be appropriate in assessing the cost of each of the various activities performed by academic staff. Premises valuation by opportunity cost is a complement for ABC, in assessing the cost of capital employed, but also substitutes for some ABC costs, eg. where the allocation of maintenance and security are incorporated in the opportunity cost. The significance of opportunity costing for premises is that it defines the cost of a major resource in a manner close to the ABC ethos of 'true' cost, in place of costs which are a consequence of historical values and financial accounting constraints. It also supplies a means of valuing resources which are expected to be limited in the long-term, so that current decisions reflect this scarcity value.

Costing Issue: Devolved decision making

It has been noted that there has been an increased tendency to devolve decision making within universities, with costing used to support this process, along with more traditional approaches like top-slicing used in conjunction with devolution of funding. Such devolution (on a larger scale in the NHS) can lead to internal markets, where the need for centrally determined charges (based for example on ABC exercises) is replaced by free-market negotiation.

Costing Issue: Setting goals

Whatever the level of devolution, schools, departments and their managers have some freedom to act. It is important that local goals (sometimes short-term) implied by cost allocations need to be congruent with long-term organisational goals, and to provide incentive. ABC information therefore has to be used with sensitivity, when forming part of such local goals.

Costing Issue: Costing to influence behaviour

In using cost allocations, ABC aims to provide an approximation to the long-term 'true' cost of demands on resources. In light of the comments on devolved decision making and goal setting, the key alternative to this is perhaps to abandon the quest for 'truth', and instead focus on the behavioural effect of allocations, thus selecting allocation methods specifically to influence behaviour. Japanese approaches have embraced this 'influencing' approach, in particular by artificially loading costs so as to discourage resource usage and to encourage efficient process and product design. Universities have evidently been willing to make use of behavioural effects in the choice of top-slicing percentages, and in the allocation of premises costs, so the precedent is established to extend this concept further.

Some additional points arising in the literature, that relate to these issues of alternatives and

complements to ABC, are:

- ABC as practised often ignores the opportunity cost of resources.
- Opportunity costs are relevant to the costing of resources whose usage fluctuates between surplus and capacity.
- Although opportunity costing can be applied to the valuation of premises usage, there is evidence is that basing simple allocation methods on desired behavioural effects is also an effective approach.
- Allocations of the cost of some services may not be in the best interest of the organisation, in terms of resulting behaviour.
- Approaching control systems in terms of behavioural effect is more effective than attempting to define 'true' cost.
- Cultural differences suggest caution in anticipating behaviour, when transposing methods from one context to another.
- Experience shows that organisations are not always good at developing reward systems that lead to goal congruence.

3 Research Methodology

This chapter explains what methods were used in pursuit of the research objectives, and why these methods were adopted. The chapter is structured with an opening section on the development of the research design, followed by detailed sections for each of the three main components of the method: Survey, Interviews, and Statistical Analysis.

3.1 The Research Design

The objectives of this research were given (in the Introduction) as:

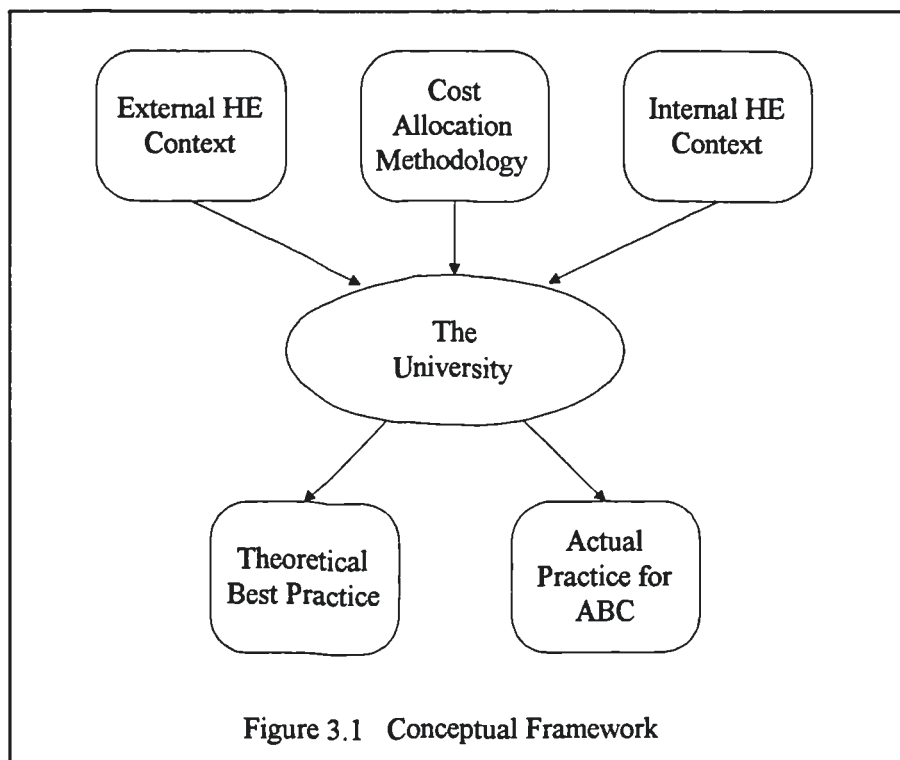
1. to develop the concept of ABC, in particular within the combination of context, structures and purposes found in UK universities.
2. to analyse and evaluate the relationship between ABC in this context, and other forms of costing and cost allocation.
3. to determine the implications for management accounting practice in UK universities, arising from this extended concept.

Because of the limited availability of published information and weaknesses in the scope of existing guidance for the use of ABC in the university context, it was concluded that the following research questions needed to be investigated:

1. What is the current state of usage of ABC in UK universities, the purposes behind its use, and practical issues arising from its use?
2. What are the distinct characteristics of the context in UK universities, as it relates to the application of ABC methods?
3. What are the relationships between the purposes of cost allocation in universities and the alternative cost mechanisms (including ABC)?
4. What can be derived from empirical evidence in UK universities concerning the applicability of ABC in this unique context?
5. What theoretical arguments and practical evidence (from other contexts) can be applied to the university context?
6. Can lessons be drawn from these arguments and evidence, relating to the use of ABC in non-university contexts?

The development of the research design started with consideration of the conceptual framework in

which UK universities are placed; this conceptual framework is demonstrated in figure 3.1. The typical UK university is influenced by two forms of context. Firstly, the 'external' context embraces for example funding availability and government policy, and the degree of collaboration or competitiveness within the whole HE sector. Secondly, the 'internal' context includes for example the organisational form of the institution, the level of centralisation or devolution, and the relationships between organisational components. The introduction to this thesis set the scene in elaborating on contextual issues in the UK, as far as they might affect costing issues.



The university is presented with a wealth of cost allocation methodology, albeit mostly derived from industrial/ commercial contexts. The literature review of this thesis endeavoured to screen this body of knowledge in terms of how it might relate (perhaps indirectly) to the use of ABC in a university. So the university is placed in its context, with a good supply of costing theory. Theoreticians can then consider how a university could and should adopt costing theory for its own context, thus developing normative advice and guidance on 'best practice'. Some of this guidance was reviewed in the latter part of the literature review, for example in JFC (1997).

However, management accounting experience has often shown that organisations may disregard normative advice in favour of other practices (for example the use of pay-back period in preference to discounted cash flow methods). While the ardent proponent of normative advice may simply

despair, or at least try harder to impress the value of the advice, the 'positive accounting' theorists have cautioned that in some situations it may be the normative advice that is wrong, the lesson being to ask why actual practice is so, and whether it does indicate a fault in the theorising that led to the normative advice.

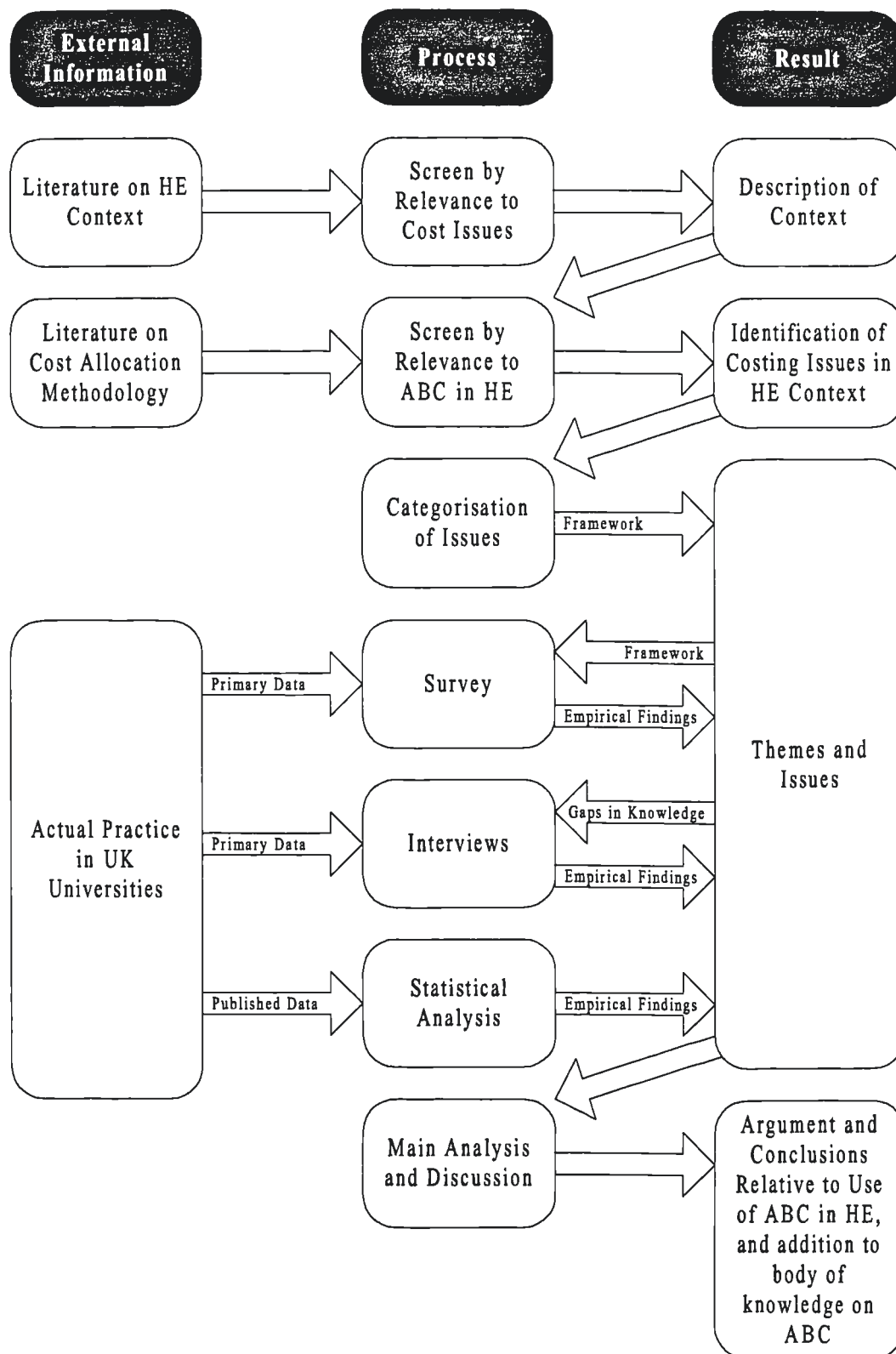
The literature review has in fact left us with a fairly good understanding of most components on the conceptual framework diagram, but with the exception of actual practice. The published normative advice does recommend the use of ABC, and what little that has been published on practices in HE does indeed indicate potential benefit from use of ABC, for example Doyle (1991). Yet the dearth of published cases or 'success stories' indicates that there has not been widespread adoption of this advice.

The role of ABC in universities could be examined entirely from a theoretical viewpoint, but potentially, in the absence of corroborative empirical evidence, the examination would be sterile, and could miss important contextual issues that arise from the 'real-life' behaviour of universities, relative to costing issues. To provide a firm base for development of the topic, it was therefore essential to capture information on actual practice, to supplement the information in published literature. This empirical information included in particular insights into the problems and benefits obtained in the practical application of the methods.

One source of information on actual practice is the comparative data that is regularly published concerning both university costs, and also certain operational statistics. While this does have some potential for developing understanding of cost behaviour, it covers only certain aspects of aggregate cost behaviour, and does not give any insight as to choices of costing mechanism that have actually been made, or indeed why those choices were made. So, to develop an understanding of qualitative issues, for example attitudes towards ABC, it was considered necessary to undertake some form of primary data collection.

The research in this thesis is essentially qualitative, and should therefore be "multi-method in focus" (Denzin and Lincoln 1994). Denzin and Lincoln stated that although "objective reality can never be captured" in qualitative research, "the use of multiple methods, or triangulation, reflects an attempt to secure an in-depth understanding of the phenomenon in question". Janesick (1994) emphasised that triangulation can also be achieved through using several kinds of data. In the research design it was therefore considered valuable to use both multiple methods and multiple data types. Figure 3.2 illustrates the research design that was adopted, so as to address the research objectives, and answer

Figure 3.2 The Research Design



the specific research questions. The approach commenced, in the Introduction, with a screening of the literature on the HE context so as to identify features of this context relevant to cost allocation. This was followed, in the Literature Review, with a critical review of published literature on cost allocation methodology and practice, screening by relevance to the use of ABC in HE. A consequence of this was the identification of a large number of costing issues that have a bearing on the potential use of ABC in HE.

The key focus for primary data collection was the survey by postal questionnaire. This allowed for a comprehensive view of UK practice, not influenced by anecdotal evidence. The basis for the questioning in the survey was the matching of actual practice against the issues raised in the literature review. The survey was followed by a small number of interviews to fill in gaps in information provided in the survey, and to refine understanding of responses given. This two-stage approach made it possible to collect a large (and thus reasonably comprehensive) set of views, yet also to enable exploration of particular issues in depth. In terms of triangulation, the interviews also provided a cross-check on the validity of survey responses.

At the heart of the ABC approach is the relationship between costs and activity levels, and the relationship between activity levels and the drivers of those activities. A conventional ABC exercise treats these relationships as proportional, and focuses on assignment of the most appropriate drivers. It is of course important to know whether the underlying relationships are proportional in the HE context, or whether fixed cost elements or non-linear relationships seriously distort the ABC-derived results. While the survey and interviews can provide information on this, such cost issues can also be explored by viewing costs and associated driver measures externally, using methods such as regression analysis, thus providing further triangulation on the survey/interview comments. This aspect of triangulation is particularly strong, as it involves a difference in both methods and data. University library costs were considered an ideal candidate for this type of statistical exercise as firstly libraries represent a predictable and relatively standardised service in all universities, and secondly, considerable data on internal measures of library operation is published by the associations of librarians.

The data used in this research is therefore a mixture of qualitative and quantitative data. Miles and Huberman (1994) support the use of such a mixture, with a view that the "quantitative-qualitative argument is essentially unproductive". They refer to several ways in which such a mixture of methods can be productive, in particular to the use of triangulation to confirm or corroborate findings.

So, there were four sources of information in the research: firstly the results of the literature review, and then the data generated by the survey, the interviews and the statistical analysis. What was needed was some systematic process to collect this information with a view to integrating the research findings. Janesick (1994), speaking of qualitative field research, stated:

"Following the process of leaving the field, final data analysis can begin. Of course, the qualitative researcher has been developing categories from the data through constant comparative analysis over the entire time frame of the study. The process of reduction of data into a manageable model constitutes an end goal of qualitative research design."

The importance of the development of categories was further emphasised by Richards and Richards (1994): "... the generation of categories, even the simplest descriptors, whether arrived at prior to data reading, or by discovery of recurrent topics or ... , is a contribution to theory". A focus on categorising was evident as a logical means to guide the sequence and linking of the components of the research, so as to achieve a coherent set of results aimed at answering the research questions.

Therefore, the selected sequence of steps in the method was:

- Categorisation of costing issues, arising from the literature review, related to the use of ABC in universities.

This established a set of 'themes' which formed the foundation for the design of the research, and a framework in which to place the results of the research, as follows:

1. The HE context for ABC
2. The purposes of cost allocation
3. The costs to include in the analysis
4. Carrying out the ABC exercise
5. Consequences of the ABC exercise
6. Alternatives and complements to ABC

- Survey to obtain empirical evidence of UK university usage of ABC, in particular to identify the benefits and weaknesses of ABC.

The key research question addressed was that of identifying current usage, and the format of the survey questions was linked to the themes identified from the literature review.

- Interviews to explore gaps in information relating to issues identified.

The primary goal of the interviews was to fill in gaps in knowledge apparent from the survey, again within the thematic structure.

- Analysis of published data on library expenditures, to explore certain issues of cost

behaviour.

The value of this statistical analysis is to triangulate on certain issues, based on the chosen data-set.

- Thematic discussion of issues and evidence in support of the research argument.

This discussion (in chapter 5 of the thesis) was thus presented in a clear framework, where evidence (some from multiple sources) was collated and synthesised.

In quantitative research, but more so in qualitative research, one recognises the possibility of personal bias in the design of a research programme, and the selection and analysis of empirical data. Some proponents of what they see as a 'pure' inductivist form of grounded theory would perhaps resist making an initial categorisation until it became apparent from the empirical data. However, for this research, it was impossible to ignore the indications already apparent (to the researcher) in the literature review (from other contexts), and the survey results would have been less useful if the design had ignored these prior indications. In fact, Strauss and Corbin (1994) pointed out that the early work on grounded theory "overplayed the inductive aspects" and "underplayed both the potential role of extant (grounded) theories and the unquestionable fact (and advantage) that trained researchers are theoretically sensitised". Given the wealth of knowledge available from the literature, it was therefore considered both pragmatic and justifiable to take this approach to the research.

3.2 The Survey

This section outlines the objectives of the survey of UK universities, the design of the survey, and the analysis processes used to obtain the results from the questionnaire responses.

3.2.1 The Survey Objectives

The working hypothesis for this research was that while ABC is theoretically attractive, and in some (non-HE) circumstances has proved to be practically beneficial, specific benefits and difficulties may arise in its implementation in a university context. An example of anticipated difficulties was how to reconcile an essentially centralist view of cost in ABC with the semi-autonomous nature of schools within devolved institutions. While specific issues may arise to a greater or lesser degree in other organisations, the university sector does provide an apparently unique context for such issues.

However, little published work was available on ABC experience in universities. Without some form of survey of practice, there was therefore a risk of neglecting potentially important but unpublished issues, which perhaps had already been identified through experience. Following the spirit (rather than some of the contentious detail) of Positive Accounting theory it was also considered to be worth examining why some institutions had not tried the ABC approach at all, in case this also revealed some contextual weakness in ABC. Thus a survey was considered appropriate as a means to add important detail to the themes arising from the literature review.

Universities world-wide share common functionality, although many national differences exist. Because of relatively recent changes, however, the UK sector now presents within itself a very diverse set of institutions. Practical considerations of expense, time and language made the survey more feasible if it was restricted to UK institutions, in particular enabling low-cost follow up actions to improve response rate or to obtain further detail. Because of the diversity within the UK, this was considered to be acceptable, provided it is understood that in other national contexts, other national-specific issues may arise.

An objective for this research was to extend knowledge in the public domain of ABC's potential for use in universities. It was in particular the intention to disseminate the results of the survey for the benefit of other researchers and practitioners in this and related areas. (This was accomplished by publishing the results in Mitchell (1996) and by distributing a copy to the survey respondents. The article was also subsequently incorporated into an open learning package by CIPFA.)

3.2.2 Survey Design

The target was therefore the UK university sector, of which a list of institutions had been obtained, covering all universities and also a few large university colleges. Because of the wide geographic dispersion, the method chosen was a postal questionnaire. Moser and Kalton (1971), Youngman (1984) and Bell (1993) were key sources of detailed guidance on the design of questionnaires, the form of questions, and other aspects of survey design. Respondents were asked whether responses were to be kept confidential both in terms of this thesis and other forms of publication, and these requests were respected.

A pilot exercise of some sort is invariably recommended. For this survey, to avoid 'using up' some of the institutions for a pilot, the pilot was conducted with three senior staff at Oxford Brookes

University (Two deputy heads of schools, and a school finance officer). This exercise turned out to be useful in reinforcing the points made in the literature, in particular in sharpening the focus of the questionnaire to the objectives of the survey. For example, the early draft had asked for considerable detail about the allocation methods and drivers used for each of the central services. While this sort of detail would certainly be of interest, it would have increased substantially the burden of completing the questionnaire and thus risked lower response rates. In any case, the objectives of the research were not to obtain the detail of ABC allocations, but to know whether institutions were using such detail, and how they viewed the results of doing this. Another example was that the first draft asked about the computer software being used; this question was also removed for similar reasons.

A number of changes were also made to the questionnaire to improve response rate, although this was not considered over-critical for this research, because of the intention to identify issues rather than to quantify. These latter changes for example included personalising the letter and the questionnaire.

The opening question was:

- Has the institution carried out some form of ABC exercise?

Depending on the answer, the respondent was referred to one of two separate sections in the questionnaire.

For institutions that stated that they had not carried out an ABC exercise (referred to in the later text as the 'non-ABC set'), respondents were asked to give their views on the applicability and value of the methods in their university, and what single most important factor might prevent use of these methods. To get a view on the attitude to allocation of costs, respondents were also asked if they carried out any form of central cost allocation, and whether they had considered using ABC methods.

For institutions that stated that they had carried out an ABC exercise (the 'ABC set'), a more detailed set of questions was devised, starting as follows.

- What were the objectives of the ABC exercise?
- Was it a one-off exercise or is it a regular/annual exercise?

These questions were intended to add detail to theme 2 (the purposes of cost allocation).

One concern was what a respondent might mean by the expression 'ABC'. Although it has a specific meaning, as used in this thesis, it has to some extent become popularised as a 'buzzword', and on

occasion it has been used to describe allocation systems that simply use multiple drivers or allocation bases, even where no activity analysis has taken place. To resolve this, the following question was included as to the specific drivers used in allocations.

- In allocating central costs, what cost drivers were identified as being linked to activity levels?

A large range of drivers, or the inclusion of sophisticated drivers, would indicate a thorough ABC analysis, whereas a small range of simply-defined drivers (eg. Students, Staff, and Premises space) would indicate a more traditional allocation exercise.

There was a concern that the questions asked might limit the types of response, might steer responses in some way, or might fail to reveal some unsuspected (to the researcher) issue. Thus rather than give large checklists (of say plausible cost drivers, or potential benefits/ problems), questions were generally left open, occasionally illustrated by examples to make meanings clear.

To add detail to theme 3 (the costs to include in the analysis) and theme 4 (carrying out the ABC exercise), the following questions were included.

- Were there any elements of central cost for which no suitable driver could be identified (ie. fixed or core costs)?

(This question was clearly needed, given the comments in Scapens *et al.* (1994) relative to experience at Manchester University).

- Was the allocation of central costs only to academic departments and faculties, or was it down to course and programme level?
- Did the ABC exercise also extend to the allocation of academic department costs?
- What cost drivers were used for the allocations of these academic department costs?
- Were there any fixed or 'core' elements of these academic department costs for which no suitable driver could be identified?

Finally, to support theme 5 (Consequences of the ABC exercise) and theme 6 (alternatives and complements to ABC), the following questions were included:

- For the institution as a whole, did the ABC exercise prove worthwhile? What are the benefits?
- What were the problems?
- What are your overall views and conclusions about the applicability and value of the ABC approach in your university?

The survey was mailed on Wednesday 19 October 1994, personally addressed to the finance directors of 100 university institutions. This included all publicly funded UK universities, and the

larger constituents of the universities of Wales and London. A sample of the covering letter, and the questionnaire is included in Appendix 1, along with some detailed design points, and the list of institutions surveyed.

By the requested return date of 4 November 1994, 30 replies had been received, and by 15 November this had increased to 40 replies. All the texts on survey methodology suggest at least one follow-up action to increase response rate. Moser and Kalton (1971) commented that experience has shown that if say a 40% response rate is achieved on the first mailing, then the follow-up often achieves 40% of the remainder, ie. in this case another 24 replies.

The follow-up letter was mailed to the non-respondents on Tuesday 15 November 1994, with a further copy of the questionnaire and again with a reply-paid envelope. This did indeed generate 24 further responses (precisely!) through November and December, so giving 64 questionnaire responses in all. This response rate of 64% is comparable with the 52% achieved by Newton (1997), and the 77% achieved by Pendlebury and Algaber (1997) in similar surveys of financial practices in UK universities.

3.2.3 Survey Analysis

The responses required from universities were different dependent on whether or not they had carried out an ABC exercise, so separate analyses were performed on the two sets of responses. These sets are referred to as the ABC set and the non-ABC set. Allocations from central departments were to faculties, schools, or academic departments, sometimes with a two level faculty/department structure. In terms of this survey this variation made no real difference to the responses or analysis, and 'school' will be used to refer to any of these organisational forms. Analysis proceeded step by step as follows.

Step 1:

The analysis of the 48 responses in the non-ABC set started with an unstructured examination of all responses, identifying all issues or views onto a working note. This approach was taken, since although it was desirable to categorise the responses in some way, there was no preconception of what those categories might be. The questions asked were:

- 'What are your views about the applicability and value of ABC methods in your university?', and
- 'What is the single most important factor which might prevent the use of these methods in your university?'

It became clear from this initial review that although there was immense variety in the views/issues expressed, these views/issues varied largely due to the overall stance taken towards ABC methods. Miles and Huberman (1994) described a set of 'tactics' for generating meaning from qualitative data, one of which is clustering by conceptual grouping.

Step 2:

The non-ABC responses were therefore re-examined so as to categorise the stance taken towards ABC methods, with the following main categories:

1. Not worthwhile
2. Possibly worthwhile
3. Useful but not actioning
4. Useful and actioning

Two specific yes/no responses were also requested from the non-ABC respondents:

- Do you have any form of central cost allocation to schools?
- Have you considered using ABC methods?

The latter question was intended to simply ask whether *any* form of consideration or thought had been given to using ABC. Some respondents apparently interpreted this more severely, in effect treating a positive answer as implying in-depth analysis. In a few cases therefore, where a "no" was given, but where the following comments indicated that there *had* been some consideration, the response was treated as a "yes".

The responses to these questions were analysed by the above four categories.

Step 3:

The non-ABC responses were then re-examined in detail, to identify the main views and issues within each category.

Step 4:

Attention now moved to the ABC set of respondents, ie. those who said that they had carried out an ABC exercise. This first review of the 16 institutions in the ABC set was to obtain a broad picture of the types of response.

Step 5:

The first review of the ABC set clearly indicated that there was a spectrum in terms of the degree of sophistication used in the ABC exercise. This next step therefore reviewed all the responses so as to categorise according to the level of sophistication of activity analysis, as follows:

- Category 1: Low sophistication (4 institutions) (No significant activity analysis)
- Category 2: Medium sophistication (7 institutions) (Some use of activity analysis)
- Category 3: High sophistication (5 institutions) (Intensive use of activity analysis)

Step 6:

Following the above categorisation, the responses were again reviewed, this time to identify commonality of views on ABC, from the 12 institutions who had carried out activity analysis.

The final stage of the analysis of the survey results was to review all the findings within the thematic framework.

3.3 The Interviews

This section outlines the objectives of the five interviews (conducted following the survey), the design of the interview process, and the steps taken to analyse the interview responses.

3.3.1 Interview Objectives

The objectives of the interviews were to fill in gaps in knowledge following the survey, and also to explore any important issues in more detail. In addition there was an implied cross-checking on the validity of survey responses.

The results of the survey are given in detail in the next chapter but, for the purposes of clarifying the interview objectives, are summarised here. Certain aspects emerged particularly strongly and are summarised in terms of the themes:

Theme 1: The HE context for ABC

The responses clearly indicated that the central finance function saw schools as self-contained 'black

boxes' with budgets and perhaps target surpluses, and that there was little interest at the centre in product-level or operational detail within those schools.

Theme 2: The purposes of cost allocation

Consistent with the above viewpoint, the majority of respondents thought of ABC in terms of a role in allocating central costs to schools, rather than (as is usual outside HE) to products or services, so that the purposes were generally limited to the refinement of calculation of overall school costs.

Theme 3: The costs to include in the analysis

For those that used ABC, a dominant view was that there are central fixed or core costs (in particular of central management) for which there is no ABC driver.

Theme 4: Carrying out the ABC exercise

There was concern about the complexity, time and cost of the exercise. This view partly appears to stem from a comparison with the simplicity (or absence) of existing allocation methods, but the allocation of academic staff time was mentioned as a particular difficulty, with an implication that little would be achieved without this.

Theme 5: Consequences of the ABC exercise

The purpose of more rational/equitable allocation to schools was largely achieved by ABC users. What also strongly emerged as a benefit was that the exercise resulted in improved understanding of costs, especially in schools. There was little evidence of the use of the ABC information for product costing, and no evidence of its use for cost management within schools or departments.

Theme 6: Alternatives and complements to ABC

The key alternative (aside from avoiding allocations altogether) was to adopt simple allocation schemes based on students, staff and premises space. The latter cost was mentioned as a particular concern, and it was apparent that cost allocation was seen as a means of discouraging waste of this resource.

The survey results thus produced a range of insights into the applicability of ABC in HE. However, these results also raised a number of important (and unanswered) questions:

The 'Black Box' View of Schools (related to themes 1, 2 and 4)

Finance officers seem to prefer a devolved 'black box' view of schools rather than embrace product-level detail. This attitude is different from many commercial organisations, where the finance officer would often be keenly interested in this detail. What is not clear in universities is therefore:

- Why do finance officers seem to prefer a 'black box' view of schools rather than pay close attention to product-level detail?

The Costs of Central Services (related to themes 2, 3 and 5)

Allocation processes can provide useful information in the management of central overhead costs, yet this does not appear to be part of the current thinking of finance officers. What is not clear is therefore:

- If allocations from central services to schools are simplistic (or non-existent), then how are expenditure budgets set for these services, to reflect changes in the demands on these services?
- Why do finance officers not apparently see a role for ABC in terms of understanding cost behaviour and efficiency in central services?
- Are finance officers firm in the belief that there is not a link between the size of central management costs and drivers like number of students, number of courses, and so on? (ie. confirming the view of the existence of fixed costs unrelated to drivers)

Academic Staff and Premises (related to themes 2, 3, 4 and 6)

Academic staff time does not generally seem to receive central finance attention other than to allocate it en-bloc to schools. The first question that arises is therefore:

- Why do institutions generally prefer to allocate academic staff to schools as a staffing 'establishment', rather than as an expenditure budget?

Even where the allocation is as a cost (rather than of time or 'establishment' staffing), it seems usually to be directly to schools, and not a lower level. Some survey comments mention the difficulty of allocating academic time in finer detail. Similarly, premises are generally allocated as a space/time process, rather than in financial terms, so similar questions arise:

- Why do institutions generally prefer to allocate premises to schools (and support departments) by space and time used, rather than as an expenditure budget?
- How is efficient usage encouraged in the absence of cost allocation methods?

Given that academic staff and premises are perhaps the largest cost elements in a taught course, there was an impression in the survey comments that where these are not treated in fine detail, then fine detail is not justified for other smaller costs. What is not clear is therefore:

- Is the allocation of academic staff time and premises usage so complex that it discourages attention to detailed allocation of other lesser costs?

Premises are often a scarce capital resource, and yet if a costing calculation is performed, it is generally only allocation of operating costs and depreciation. This raises the question:

- Why is there so little apparent interest in opportunity/market costing?

The overall objective of the interview stage was to add detail to the information gained in the literature search and in the survey. The gaps in knowledge, identified in the survey results, and represented by the questions above, were therefore the basis for the design of the interviews.

3.3.2 Interview Design

The purpose of the interviews was to gain some further insight on particular issues. In designing this stage of the research, certain aspects of interviewing were raised in Bell (1993), each of which required examination in terms of this set of interviews.

The form of the interview can range from unstructured through a spectrum to highly structured. For the current research, the information desired from the interview is quite specific, therefore some form of structuring was considered important. However totally closed questions would not have been appropriate, as for each issue of concern it was not clear what alternative responses might be given, for example in determining to what extent schools are seen as self-contained 'black boxes'. The chosen semi-structured approach was therefore a set of key questions, each of which was supplemented by 'prompt' or 'probe' questions to be used as needed to expand on the initial response. The key questions for the first four interviews are based on those given in the preceding text; the actual questions, as asked, are given in Appendix 1.

Interviews are to some degree a subjective process, and liable to bias, for example where emphasis placed in questioning can inadvertently lead the respondent to particular answers. This is largely addressed by the self-discipline of the researcher, but questions and prompts were chosen to minimise this effect, for example by prompting in a balanced way regardless of the initial response. Also, questions were phrased so as to minimise the impression of what might be viewed as the 'correct' response.

Telephone interviewing is low cost and relatively easy to schedule, and could reasonably be implemented for a standard set of questions. However, the researcher was not confident that respondents might be as forthcoming as in a face to face situation (in particular about what they might perceive as shortcomings of current practice), so the chosen approach was to use face to face interviews. Although this was more expensive and time-consuming as a method, it was considered that the interview objectives (of obtaining understanding of certain issues) could be met by relatively few interviews, so that the time and cost were not significant enough to override this judgement.

The method of recording responses needs careful choice. For these interviews, tape recording was excluded as a method because of the possibility that respondents would be less forthcoming. Bell suggested that where transcription of rough interview notes is done immediately (or very soon) after the interview, little is lost in any case. To facilitate the recording of responses, the interview checklist document was therefore designed to record responses also, and time was allowed on the same day as each interview for a detailed transcription.

As with questionnaire design, a pilot exercise is recommended. For example, Janesick (1994) stated that "the pilot study allows the researcher to focus on particular areas that may have been unclear previously. In addition, pilot interviews may be used to test certain questions". The first interview was therefore treated as a pilot, in testing the structuring and quality of the questions. The following occurred in the pilot interview, and changes were made as noted, for the following three interviews:

- The questioning used in part of the interview inadvertently could be seen as implying criticism of finance officers in general. The wording was amended to remove any implied criticism.
- A question on academic staff and premises proved to be overly complex and confusing. This was therefore separated into two distinct questions.
- The distinction between central management and central services was not sufficiently clear in the questioning. The wording was amended accordingly.

By the time that four of the five interviews had been conducted, it was clear that there was a degree of consistency in responses, and that little would be achieved by repeating the questions for the final interview. Accordingly, the opportunity was taken to explore a smaller number of aspects in greater depth. Some brief questions were asked concerning context and purposes for this university, which was an ABC user. However the main focus was on the consequences that arose from dissemination and use of the results.

3.3.3 Selection of Institutions for Interview

It was expected that there would be some consistency in interview responses, based on ad-hoc comments made on the survey questionnaire responses, and that a relatively small number of interviews would be sufficient. Accordingly it was decided to select five institutions from those that had responded to the survey questionnaire, where some information would be already known about the specific context. All five institutions agreed to the interview. The intention was to expand the number of interviews if inconsistencies arose in the first set, but this did not prove to be the case. The institutions were selected so as to include at least one from those who had no plans to use ABC, and one each from those who had implemented ABC with medium and high sophistication. Similarly the selection was made so as to include at least one respondent from each of the old and new university sectors (although in fact the survey results showed no real difference in attitudes between the two sectors). The selection criteria were met within the first four interviews.

3.3.4 Interview Analysis

Miles and Huberman (1994) suggested that a good starting point for analysis of field contacts is a one-page 'contact summary sheet' for each contact or interview, identifying who was involved, and the key observations from the contact. Such a sheet was devised for the initial interviews. Miles and Huberman stated, of this method: "It pulls together the data in the ... mind - and makes them available for further reflection and analysis". The main goal in this part of the research was to provide a starting point for the data analysis, in that the initial interview results could be considered in combination, to assess whether there were clear differences in the responses.

In fact, the responses (for the initial four interviews) were largely consistent, albeit with some institution-specific variation. This set of responses was summarised within each interview question, and the responses for the final interview were summarised separately. All these responses were examined as to their relationship to the research themes.

3.3.4 Reflections on the Methodology of the Interviews

The interviews were perhaps the most enjoyable single aspect of the research. The structuring of the questions proved satisfactory, and responses were clear enough to the questions, so in this sense the process was a success. What was unexpected however was the extent to which interviewees were

enthusiastic about the opportunity to talk about these issues. The university management accountant (or the financial/ public accountant charged with this responsibility) seems to have little opportunity to debate these issues in the day-to-day workplace. One of the interviewees stated (paraphrased) "It is nice for once to be able to talk about these issues to someone who understands what I am talking about".

This of course made for a good rapport in the interview, and to greater confidence that the responses were made honestly, and not distorted to reflect what might be perceived as 'correct' answers. It also added confirmation of the value of the face-to-face approach rather than telephone interviews. It also perhaps partially explains why such a good response rate (64%) was achieved from the postal survey.

With hindsight, there was an aspect in which the interview design could have been improved. During the interview, the discussion (as might be expected) at times strayed from the specific question, in particular to descriptions of 'how we do things', 'how things have changed', and 'how responsibilities have changed'. While the interview did in the end deliver its results, it might well have been structured so as to establish the specific university context clearly at the start of the interview. So with hindsight, the interview could have opened with a question to establish this context, for example: 'could you outline the current role of the management accounting function at your university, and how it has changed in recent years?'. Although this would not have changed the results, it probably would have helped the flow of subsequent questioning, and perhaps made the process more efficient in use of time.

3.4 Statistical Analysis of Library Cost Data

This section outlines the objectives of the statistical analysis of published data on library costs of UK universities, the design of the analysis, and the detailed processes used to obtain the regression results from this data.

3.4.1 Objectives of the Statistical Analysis

The ABC approach assumes that 'drivers' represent demands on resources and services which are reflected in increased activity levels, and that expenditures are ultimately matched to these levels.

Thus ultimately there is a long-term relationship between costs and drivers. A conventional ABC exercise treats the costs as separable into pools, each associated with a single driver, with relationships that are proportional. Restricting ourselves to long-term costs, the general form of the overall cost function would be:

$$Y = \text{function}(X_1, X_2, \dots) \quad (\text{where } X_1, X_2, \dots \text{ are driver variables})$$

The implied ABC assumption is therefore that all such functions are additive in nature, with costs separable into components that each depend on only one driver, ie. with no interactions between drivers:

$$Y = f_1(X_1) + f_2(X_2) + \dots \quad (\text{where } f_1, f_2, \dots \text{ are each functions of one variable})$$

Furthermore, the implied ABC assumption is also that each of these functions is linear with no constant term, ie. no economies or diseconomies of scale:

$$Y = a_1X_1 + a_2X_2 + \dots \quad (\text{where } a_1, a_2, \dots \text{ are constants})$$

These are severe restrictions on the form of the long-term cost function. This part of the research examines the cost function by taking an external view of one aspect of university operations (rather than the internal view from the survey and interviews). For university libraries, published information was available not only on expenditures but also on many potential drivers. Therefore there was an opportunity to test out the overall cost/ driver relationship in an objective way, with data that was amenable to regression analysis.

Regression analysis is a powerful tool for this research in that by omitting the intermediate activities and focusing only on the costs versus drivers, it approaches the cost relationship in a different way, and with different data, than are implied in survey/ interview questioning. This therefore provided triangulation in assessing these particular cost relationships. In fact, where appropriate data is available for regression analysis, it could be argued that it may produce insights into cost relationships that are potentially more objectively-based than the conventional ABC exercise. The reason that regression could be so useful is that it might reveal aspects of the relationships that are not obvious otherwise. For example, it might reveal the existence of a non-proportional relationship between expenditures and driver levels, and, where several drivers are present, it might assist the ABC practitioner in assessing the relative impact of each on activity levels, and thus on costs.

In fact, it may be difficult to achieve this without regression methods, within the time and cost available for an ABC exercise. If conventional advice is taken (eg. JFC 1997) for a university

exercise, the ABC interview with the manager of a service department focuses on identifying drivers, and linking these to existing levels of activities in the service department, and does not address economies of scale. If the interviewer were to ask such questions, there is no guarantee of accurate answers within the time and cost limitations of the ABC exercise. For example, if the manager were asked "If driver levels had always been 20% higher (or lower), what levels of expenditure would we be observing now in your department?", the respondent could reasonably reply that an accurate answer would need extensive work (would it mean a different organisation? different premises? different computer systems?). If pushed to a subjective opinion, in the absence of clear evidence for either economies or diseconomies of scale, the most reasonable assumption would probably be to assume proportionality.

Another problem with asking questions like these, is that it pre-supposes that senior management will match long-term expenditures to driver levels and the associated demand for service/resources. In practice, long-term expenditure on a service department is usually the result of some form of negotiation, often specific to the industry or organisation. While demand for services is certainly a factor in the process, so too, for example, may be the attitudes of operating departments towards expenditure on central overheads, and the competing demands from other service departments. Yet another problem with asking this question is that although phrased in terms of long-term expenditure, the respondent may find it difficult not to be influenced by current short-term issues, for example in a company currently suffering from an industry recession.

So there is a question as to how to objectively uncover what the organisation would really be spending on the service department in different scenarios for driver levels. One approach in an organisation would be to look at the history of expenditure versus driver levels, to try to uncover the relationship. This would not be easy as, for most organisations, going back more than a few years takes the researcher back to a different type of business (for example with less dependence on computers, with less international competition, or perhaps when a lower level of performance was acceptable). The problem then is that with only a small set of data, analysis is restricted, and may be insufficient to draw firm conclusions. Roth and Borthick (1991) and Milne and Milne (1992) demonstrated this approach, but with artificial examples, that failed to warn of the considerable difficulties involved both in the use of small sets of real-life data, and also in addressing non-linearity and cross correlation.

An alternative approach which avoids the influence of time-related changes is to compare expenditure/driver patterns simultaneously across a number of similar organisations. Although there

are many organisations where such comparative data is not available, in some situations trade (or similar) associations do already collect information for statistical purposes. Working with real data in this way, Midwinter and McVicar (1993) used regression analysis to demonstrate that UK public libraries attain economies of scale when larger populations are served. Their research used annual UK Public Library Statistics (produced by CIPFA). Similarly, using published data on UK university expenditures, regression analysis was also used by Arnott (1992), to determine whether economies or diseconomies of scale are present in the university sector, and thus to assess whether there is an 'optimum' size of university.

The use of regression methods across an industry sector can be useful, but the approach is not without some limitations. Fairclough (1992) indicated a number of weaknesses in the regression results used by UK central government to determine certain components of the local authority grants system. These weaknesses included: poor overall fit of the regression equations (measured by the R^2 statistic), low significance of individual components of the equation, distorting effects of individual data values, correlation between independent variables, and hidden non-linear relationships.

The objective of the analysis that follows was to adopt the precedent set by Arnott and others, and use regression analysis to explore the relationship between a typical service cost (the university library), and some potential drivers, with the aim of determining whether the assumptions behind conventional ABC analysis are valid for this aspect of university cost. In this process, due care was taken as to the limitations of the method. *The initial statistical analysis was submitted for publication in May 1995, and published in Mitchell (1997).* Some further refinement in this thesis has led to some small differences in the results of the analysis.

3.4.2 Design of the Statistical Analysis

The organisations whose data were examined were the UK Polytechnics and Universities as they were in 1991-92, before the two types of organisation had converged. Different historical development had led to marked differences in funding and expenditure patterns between the two sectors. For example CAPP (1993) made a number of comparisons of library expenditures, for example, referring to purchases of books and periodicals, "the average amount spent per Polytechnic student is £26 as opposed to £43 per University student". Because of these differences in total expenditure between the old and new universities, it was anticipated that similar differences might arise in their cost relationships, and so separate analyses were performed.

In most comparisons of library expenditures in UK universities, there is an assumption that as the number of full-time equivalent students (FTE's) increases, then so should library expenditure, pro rata. Indeed, expenditure per FTE is by far the most common means of comparison. Therefore, in an ABC exercise there is no doubt that the number of FTE students would emerge as an important driver of activity levels and thus (it would be presumed) of library expenditure.

However, even if FTE was a fully effective measure of the demands placed on library resources, there is the possibility of economies or diseconomies of scale. One could argue that while certain facilities would have to increase pro-rata with student numbers, this is not necessarily true of all facilities. For example a microfiche printer that is rarely used in a library serving 1000 students might support additional students without extra cost at the same location. Therefore it would seem reasonable to allow for the possibility of a constant term in the cost relationship.

Universities differ from one another in many ways, even where student numbers are identical, and this creates differing demands on library resources. Examples are the mix of academic disciplines, the balance of undergraduate versus postgraduate students, and the balance of teaching versus research. Follett (1993) made clear the diverse nature of library provision in universities, for example the balance between expenditure on staffing versus other resources, following from differing university strategies on access versus holdings. Given all these imponderables, it is quite possible that the true overall demand on library resources could be better represented by some predictor other than the total number of FTE students. Better predictors could be for example the number of academic staff, or the number of postgraduate students, or indeed some combination of such factors.

In this research, the method used to determine the relationships between variables was Linear Regression. There are problems in applying this method when as here the possible predictors are themselves inter-related, in that the effect of one predictor may be masked or diluted by another. Therefore the results would not reveal the fine detail of multiple drivers that would be possible in a detailed ABC exercise.

Similarly, a problem arises in dealing with non-additive and non-linear models in that a limited data-set is inadequate for exploring all possibilities, and producing results with some reasonable level of confidence. Accordingly it was decided to restrict attention to additive models (with a constant term), exploring issues like non-linearity only where strongly suggested by the data, in particular in the form of graphs, both of data and of residual errors from regressions.

An issue with multiple linear regression is how to select a 'best' subset of variables from the larger set of variables available. Firstly, as pointed out by Chatterjee and Price (1977), "There is no unique 'best set' of variables....The set of variables which may be best for one purpose may not be best for another." They gave these recommendations, depending on the purpose of the final equation:

- Description and Model Building: explain the largest part of the variation with the smallest number of variables.
- Estimation and Prediction: minimise the mean square error (MSE) of prediction.
- Control: seek small values for the standard errors of coefficients.

In the analysis in this thesis, the first of these seems most appropriate, so the coefficient of determination (denoted as R^2) was used as the primary indicator, with 'adjusted R^2 ' used to compare regressions with differing numbers of variables. Regression output includes standard error of estimate, which is a useful secondary indicator (related to MSE). In addition, the standard error of individual coefficients is a useful check on the validity of including variables; a useful derived value is the probability (the 'p-value') with which the resulting t-ratio (coefficient divided by standard error) could have occurred by chance.

A second issue with selection of variables is whether an automatic iterative 'stepwise' approach can be trusted to arrive at this 'best' solution. The stepwise procedures commonly used are forward selection (FS)(starting with no variables, and adding one at a time according to largest correlation with residuals), backward elimination (BE)(starting with all variables, and dropping one at a time according to smallest t-ratio, or largest p-value, of the coefficient), or a combination of these two. Chatterjee and Price stated that "these procedures are quite efficient with non-collinear data. We do not, however, recommend the use of stepwise procedures with collinear data.", and also "Although we do not recommend the use of stepwise procedures in a collinear situation, the BE procedure is better able to handle multi-collinearity than the FS procedure."

Chatterjee and Price suggested the possible use of ridge regression (rather than conventional least squares). Ridge regression minimises the sum of mean square errors (MSE) of the coefficients, ie. its goal is to decrease the distance between the true values of the coefficients and the estimates of these coefficients, and it tends to produce more stable results in the presence of multi-collinearity. However, Stuart and Ord (1991) pointed out that there has been criticism of the ridge regression approach, in particular of the use of a simple sum of MSE's.

In the university library cost data, many of the variables were indeed highly correlated. Therefore the approach chosen was in general not to use an automatic stepwise procedure, but instead to explore all possible combinations of variables. Given that the total number of variables was not large, this was not an impracticable approach, and avoided the weaknesses of the stepwise and ridge approaches. The analysis included a regression containing all the independent variables, which indicated the maximum value of R^2 that could be achievable from the data, if significance of variables was temporarily ignored, and thus provided a useful comparator for other regressions. In addition to using the original data variables, some new variables were created by transformation of the original variables. Certain of these transformed variables did not show such strong cross-correlations, so judicious use was made of stepwise approaches in this case.

The regression analysis for the 'new' UK universities, mostly polytechnics prior to 1992, used statistics for 1991-92 from COPOL (1993). Data was available for 42 institutions, 32 of which were included in the initial analysis. The basis for examination of the older universities was the 1991-92 data for 30 UK universities, from SCONUL (1993). A list of the institutions in these samples is in Appendix 2.

Regression results can be unduly influenced by a single extreme value in an observation (an 'outlier'), giving an apparently statistically significant effect. Stuart and Ord pointed out that the distortion can be caused by a value of the independent variable outside the range of values of other observations ('leverage'), or by a residual error much greater than other residuals ('influence'). For this reason the institutions were selected to exclude those containing such extreme values, as well as those containing incomplete or inconsistent data, and those not representative of university libraries in general (for example the Bodleian copyright library at Oxford).

It is interesting that Arnott (1992) did retain some extreme values in the data-set used in his analysis of UK university costs relative to size. While the majority of institutions were in the size range 3000 to 14000 students (the data was up to 1991), he included two much smaller institutions (London Business School and Manchester Business School, each with less than 400 students) and one much larger institution (The University of London, with 47000 students) outside this range. In fact the small institutions differed not only in size, but in their nature, ie. they were not simply scaled-down versions of conventional universities. As the objective of Arnott's analysis was to draw general conclusions about economies of scale in conventional universities, it would perhaps have been better to exclude these from his sample, as non-representative and potentially over-influential on the

statistical results.

For the statistical exercise in this research, the 1991/92 data was considered the most appropriate, as it preceded the merger of the two higher education sectors, which potentially could have led to temporary increases in expenditure in the COPOL institutions in an effort to 'catch up'. However, while the 1991/92 data was adequate for the purpose, it was decided to carry out a brief examination of data for a later period (1994/95) when perhaps temporary expenditures had ceased. The purpose of this more brief examination was not to explore changes in the institutions or their library expenditures, but to confirm the validity of the approach used on the 1991/92 data, in deriving lessons about the applicability of ABC.

3.6.3 The Analysis

The analysis began with an examination of the Polytechnic 1991/92 data in COPOL (1993). In what follows, this set of data will be generally referred to as 'the COPOL data'. The analysis of this data commenced with a regression of Total Library Expenditure (TE) on all driver variables under consideration, using the full data set of 32 observations, and the following driver variables:

- Number of full-time equivalent students (FTE's)
- Number of undergraduate students
- Number of postgraduate students
- Number of academic staff
- Number of other users (non-academic staff and external borrowers)

Following this regression, a number of further regressions and correlations were carried out to explore in detail the relationship between total expenditure and these drivers. Most of these variables are of course inter-related, and an effect based on say non-academic staff might well be significant simply because this is a proxy for the size of institution and of student numbers, rather than because of the resources needed to support the actual library usage of these staff.

The initial full regression showed no particular signs of non-linearity, but it was considered worthwhile to carry out a brief check on this issue before carrying out the (lengthy) process of exploring alternative regressions. To pursue these issues of non-proportionality and non-linearity, three regressions were carried out using these independent variables:

- FTE without constant term

- FTE with constant term
- FTE and FTE^2 with constant term

Returning to the full set of regressions, the total expenditure of a library can be separated into components, for example: library staff expenditure, and materials expenditure. It was considered that the mix of expenditure in the total might conceal more clear-cut relationships with the components. Therefore, as well as conducting regressions on the total expenditure, some regressions were also attempted on the individual components.

In comparing alternative regressions, the coefficient of determination (R^2) was used as the primary comparator, and 'adjusted' R^2 considered where the number of independent variables differed

Strictly, the regressions would only be valid if the residual errors had a similar distribution whatever the size of institution. In fact it is not unreasonable to suggest that larger variability would be found with larger institutions, and indeed the distribution of points in scatter diagrams appeared to lend some support to this. Therefore, as a check, a set of regressions similar to those above was carried out using total library expenditure per FTE student, as the dependent variable. Independent variables that were used were generally ratios of the variables listed above to the number of FTE students. This approach would pre-suppose that the variability in the total expenditure, measured as standard error, is proportional to the number of students; the effect could of course be more subtle, for example if it were the variance rather than the standard error which was proportional. However, it would seem that the effect of mis-assumptions here would be primarily on measures like standard error, rather than on coefficients, or on comparisons of regressions.

The regressions were chosen in terms of independent variables that might reasonably 'drive' activity levels, and thus expenditures in the library. In this sense, they are typical of the variables that might emerge in an ABC exercise. Another independent variable, institutional income from grants and fees, was also selected from the available data. In this case the variable has no direct link to activity levels. The justification for inclusion of this variable is the wide disparity in library expenditures between the 'old' and 'new' universities, and the possibility that it is the availability of larger research funding in the 'old' universities that may lead to larger library budgets. Thus here consideration is being given to an explanatory variable that would drive expenditures directly, without necessarily an intermediate activity-based link.

Analysis of the 'old' UK universities used 1991/92 data in SCONUL (1993). In what follows, this will generally be referred to as 'the SCONUL data'. A set of regressions was conducted on the SCONUL data in the same manner as those on the COPOL data.

Finally, the approach taken for the combined 1994/95 data, in SCONUL (1996), and covering both the former SCONUL and COPOL institutions, was similar. The data set used was as for the 1991/92 analysis, although some institutions were excluded because of missing data, and results of the 1991/92 analysis were used in guiding the selection of variables and in the step-wise evaluation of alternative regressions.

Chapter 4 Presentation and Analysis of Research Data

In this chapter are presented the results from the three components of the data collection and analysis: the postal survey of UK universities, the subsequent interviews, and the statistical analysis of library cost data. Some commentary is made, but extended discussion is deferred to the subsequent chapter.

From the literature review, there arose a set of 'themes' or categories of issues, each issue concerning the potential applicability of ABC in the HE context. The themes were as follows:

1. The HE context for ABC
2. The purposes of cost allocation
3. The costs to include in the analysis
4. Carrying out the ABC exercise
5. Consequences of the ABC exercise
6. Alternatives and complements to ABC

The first theme is the context itself, and the remaining themes relate to costing issues within this context. For each of the three sets of research data, the analysis is referred back to these themes.

4.1 The Survey

The results presented here follow the sequence of steps identified in the method, with a separation between respondents who stated that they had used ABC methods (the 'ABC set') and those who stated that they had not used these methods (the 'non-ABC set').

4.1.1 Results from the non-ABC set (those that had not carried out an ABC exercise)

The initial analysis of these 48 responses (in steps 1 and 2 of the method) identified that these responses could be categorised in terms of an overall stance towards ABC methods. The non-ABC responses were therefore categorised in this way, with the following main categories identified (with the number of institutions shown in each category)

1. Not worthwhile. (17 institutions)

Firm views that ABC methods were unnecessary and/or inappropriate

2. Possibly worthwhile (5)

Not sure of value of ABC, reserving judgement

3. Useful but not actioning (22)

Firm views that ABC methods are useful, but no immediate plans to carry out an exercise

4. Useful and actioning (4)

Firm views that ABC methods are useful, and planning an exercise

Two specific yes/no responses were requested from the non-ABC respondents:

- *Central allocation?*: Do you have any form of central cost allocation to schools?
- *Considered ABC?*: Have you considered using ABC methods?

A cross tabulation of the responses to these questions is as follows:

		Considered ABC?		
		yes	no	total
Central Allocation?	yes	20	8	28
	no	17	3	20
	total	37	11	48

From these results, it would appear that the existence of central allocation systems does not stimulate consideration of ABC, in fact the opposite may just as likely apply (17 out of 20 contrasted with 20 out of 28). Perhaps those without allocation systems feel that there is a greater need to move forward in some way, and are therefore more open and active in examining costing alternatives.

The responses to these two questions, by categories 1 to 4 above are:

Category:	1	2	3	4	Total
Worthwhile?	no	maybe	yes	yes	
Actioning?	no	no	no	yes	
Central allocation? Yes	10	4	11	3	28
No	7	1	11	1	20
Considered ABC? Yes	10	1	22	4	37
No	7	4	0	0	11
Total	17	5	22	4	48

It can be seen that 26 of the 48 overall (ie. 54%) had positive views about ABC (ie. were in

categories 3 and 4). It is perhaps interesting to note that of those 37 who have considered using ABC, 26 have positive views (ie. 70%). It might reasonably be conjectured therefore that many of the 11 who have not yet considered ABC might 'convert' to positive views once they do give the method consideration.

The 20 respondents who did not carry out central cost allocation to schools, did not appear to have any lesser view of the value of ABC, but of those who did view ABC as worthwhile, only 1 in 12 planned to try out ABC, compared with 3 in 14 of those who viewed ABC as worthwhile and already used allocations. There is thus a suggestion that where institutions are already using allocation systems, they are more likely to try out ABC if they view the method as having value (however the sample sizes are small, and the differences are not significant statistically (χ^2 test)).

The non-ABC responses were re-examined (in step 3 of the method), to identify the main views and issues within each category, with results as follows (Totals do not always match, due to multiple issues being mentioned in some responses):

Category 1 - Not worthwhile (17 responses)

There were 10 responses which viewed ABC methods as unnecessary, largely due to satisfaction with current systems. There were 8 responses which viewed ABC methods as inappropriate, largely because of their complexity. The concern about complexity occurred in other categories of response, and was partly a concern about the difficulty and cost of the exercise, and partly the difficulty of gaining acceptance by the non-financial community. A typical response in category 1 was (University of Southampton):

"Too subtle and complex. Allocation systems need to be clear and simple. ABC is not thought appropriate."

Category 2 - Possibly worthwhile (5 responses)

A typical response was the desire to see practical evidence of benefits. It is true that there is little in the way of such published evidence in the university context, and this could therefore be an underlying (albeit unstated) reason for the lack of interest in the methods by the category 1 respondents, 7 of whom had not considered ABC methods.

Category 3 - Useful but not actioning (22 responses)

Although there was a wide variety of responses given to issues/views, the responses fell broadly into these general reasons for not actioning an ABC exercise:

- Lack of staff resources, related to the expected time and cost of a full exercise (12 responses)
- Difficulty in getting others to understand/accept/co-operate, in particular academic staff (7 responses)
- Difficulty in doing it, in particular with allocating staff time among activities (4 responses)
- Inertia, due to reasonable satisfaction with current methods (2 responses)

A typical response in category 3 was (University of Huddersfield):

"Any method which helps to cost the university's activities must be of benefit. However, the expense of introducing ABC on a wide scale may be considerable, particularly in terms of staff time."

Category 4 - Useful and actioning (4 responses)

The concerns here mirrored the problems faced by category 3 respondents, in that although these universities were proceeding with ABC exercises, there were concerns over lack of staff resources and co-operation of university staff.

4.1.2 Commentary on the non-ABC set

The non-ABC set of respondents were those that replied "No" to the question "Have you carried out an ABC exercise?". These respondents demonstrated an overarching concern about complexity, that showed itself as three specific concerns, which were either blocking consideration of an ABC exercise, or were blocking the carrying out of an exercise:

Concern 1: The time and cost of doing the exercise, in particular within existing staff resources.

Concern 2: The difficulty in getting others (especially academics) to understand the methods, to accept them, and to cooperate.

Concern 3: The difficulty in carrying out activity analysis, especially in allocating staff time.

In the context of this thesis, one might ask whether these indicate specific weaknesses of the ABC method in higher education. Compared to existing methods in HE, which usually have simplistic allocation methods (if any at all are used), then the respondents are correct in their perception of overall complexity. So although these concerns are not specific to universities, and are general issues of implementation of ABC, they may have a specific focus, relative to the current HE context, ie. to 'Theme 1' of this research.

Where there might be a specific focus relative to the first concern is in the scale of time and cost of the ABC exercise relative to the scale of the organisation as a whole. In a university with revenues of £20 million, the question is whether the complexity of operations (and therefore of the ABC exercise) is much greater than that of a commercial organisation with similar revenues. If so, then the costs of the ABC exercise might be higher in universities relative to the benefits to be gained. However, the literature of successful implementations of ABC includes a wide diversity in terms of size of organisation, and in terms of the staffing available for the exercise, so that the first concern would appear to mirror a general concern over these exercises, rather than representing some context-specific issue.

A further potential focus for universities relates to the second concern, that of getting others to understand, accept and co-operate. Changes in university culture associated with market orientation, competition for funds, and so on, mean that the roles of academics are shifting towards a greater commercial orientation. All the same, the role of a senior academic is still far from that of a manager in a commercial organisation. The senior academic may be appointed on the basis of research record, academic leadership, and so on, and there may be little or no understanding of budgeting, cost control, or product costing; in fact the terms 'product' and 'customer' may have little meaning to some academics, in the context of what the university does. If this is a weakness of ABC in current circumstances, then it may diminish over time, as academics gradually get exposure to other accounting processes (eg. the requirement to attain a surplus of income over expenditure, or the requirement for full costing of research contracts). In a centralised organisation with detailed financial controls, this lack of management knowledge is perhaps not critical, but in a university where control is increasingly being devolved to school/ department management, there does appear to be a contextual issue, related to Theme 1.

Those respondents that had no intention of using ABC generally took this view because ABC methods were viewed as unnecessary or inappropriate. One could defend this view (perhaps from a positive accounting perspective) in that where a university is static year on year, without a sense of market pressure, it is probably true that change-oriented approaches like ABC serve little purpose. For example, if the product mix is to be kept absolutely fixed as a matter of policy, then there is no point in an exercise aimed at optimising product mix. However, if the increasing commercialisation and interest in efficiency gains proceed as they have done so far in the 1990's, then these static organisations may have to convert to a more market-responsive approach, and may thus take greater interest in ABC. Thus consideration of the HE context for ABC has to recognise the current existence of both static and market-responsive institutions.

In considering the 'non-ABC' responses against the research themes, some useful indicators emerged concerning themes 1, 2 and 4:

Theme 1 - The HE context for ABC:

A large proportion (20 out of 48) did not currently carry out central cost allocation. This appears to reflect a historical situation, where the largest costs (academic salaries and premises) are paid for centrally, and the resultant resources (staff and premises) assigned to Schools on a basis that is largely historical. Central Services also seem to be budgeted for on a similar historical basis, with a broad satisfaction about the whole process. From a central university viewpoint, the schools and departments are in these circumstances 'black boxes', where inputs and outputs are known and monitored, but detailed working practices are (in cost terms) left to the discretion of the school/department manager. A related contextual issue concerns the relatively low level of financial expertise within the schools and departments, given the degree of devolution of authority from the centre.

Theme 2 - The purposes of cost allocation:

The large number of respondents (22 of 48) who either considered that ABC was not worthwhile, or at least reserved judgement, raises the question as to what purpose they believe could be served by ABC. Many of these respondents evidently saw ABC as simply adding unnecessary sophistication to existing allocation systems, rather than as a new approach, for perhaps new types of control and decision making.

Theme 4 - Carrying out the ABC exercise:

The 26 respondents who considered that ABC could be useful, expressed great concern about both the time and cost of such an exercise, and also the difficulty in proceeding with an exercise in terms particularly of getting the full involvement of academic staff. These concerns were so great as to deter 22 of the 26 from proceeding further. These results support the 'Theme 2' comments in that evidently the anticipated purposes were expected to provide insufficient benefit to justify the exercise.

4.1.3 Results from the ABC set (those that stated that they had carried out an ABC exercise)

The first examination of these 16 responses (steps 4 and 5 of the method) was to obtain a broad picture of the types of response, so as to facilitate some categorisation of replies. This first

examination indicated that there was a spectrum in terms of the degree of sophistication used, and responses were therefore reviewed so as to categorise according to the level of sophistication of activity analysis (Categories 1/2/3 representing low/medium/high sophistication respectively).

The first category included 4 institutions that had implemented reasonably sophisticated cost allocation schemes from central departments to schools, but had not carried out any significant activity analysis. The University of Manchester was typical of these. The University, in its survey response, and in Scapens *et al.* (1994), made quite clear that although ABC was given consideration, the final system was not a true ABC system. It appeared that three other respondents were in this category, in that these had not implemented ABC methods in the sense of performing detailed activity analysis, and were relying on relatively few and unsophisticated allocation bases. The views expressed in this category were therefore treated as in effect the views of non-ABC users.

In fact many of the views of this group were similar to the responses of the 'true' ABC users (categories 2 and 3), apart from two aspects:

- The view that ABC was too complex, hence the use of simpler allocation methods (All four used students, staff, and space occupied)
- The particular emphasis on improving space utilisation (two of the four respondents)

If a key goal is to improve space utilisation, then relatively simple methods of charging for usage can evidently achieve satisfactory results, so the logic would be faultless in selecting this approach. Incidentally, by utilising charging mechanisms for premises, these institutions were of course acting consistently with the black box view of schools, in that central management sought efficiency improvement by measures external to the school in controlling its use of resources.

The focus on premises cost raised an interesting question. Premises represent a substantial part of university costs, so, because of the difficulties of allocation (or the reluctance to allocate) these costs, does this explain why there is relatively little interest in the allocation (or the allocation method) of other costs, such as the library, when these are perceived as minor by comparison? One might surmise that this is so, from the survey responses, but it was considered worthwhile to verify this point in the subsequent interviews, as an aspect of several themes (2, 3 and 4).

A further question arises if the shortage of premises is of concern, and that is what basis should be used for charging? To regulate use of a resource by charging, there is no need to use a 'true' allocated cost; any cost would serve the purpose, and in fact one could reasonably justify using opportunity or market costs, given that many universities are renting or acquiring additional

accommodation at the margin. In fact the responses appeared to indicate that the basis for allocations was largely focused on direct costs of heating, maintenance, etc. This was considered to be another useful topic to explore further in the interviews, with relevance to themes 2, 3 and 6.

In the remainder of this analysis of the ABC set, comments relate only to the 12 institutions in categories 2 and 3, ie. with medium/high sophistication of ABC methods. Category 2 included 7 institutions where there was some evidence of use of activity analysis. This was indicated by comments made, or by the use of many drivers or sophisticated drivers, for example the inclusion of both the number of students and the number of weighted students. Category 3, with 5 institutions, showed evidence of intensive use of activity analysis, with sophistication both in the drivers and in the comments made.

These 12 institutions represent 18.7 % of the sample, which is similar to the 19.5% "currently using ABC" observed by Innes and Mitchell (1995) in a postal survey of large UK companies. The next examination of the responses (step 6 of the method) was to obtain a clearer picture of the types of response, and to facilitate some further categorisation of replies. Responses to questions were as follows:

What were the objectives of the ABC exercise?

Of the 10 responses with clearly stated objectives, 6 saw the objective as being to allocate overheads to schools, mostly to establish the surplus/deficit associated with each school, but also in some cases as a means of resource allocation. Only 2 of the 10 saw a key objective in terms of product decisions at the level of courses, with 2 more seeing objectives in terms of broad programme costing (eg. teaching v. research). A typical response was (University College, London):

"To establish the financial surplus/deficit for each academic department using the most accurate possible allocation of income and costs commensurate with a low cost of data collection".

Was it a one-off or a regular exercise?

The majority (8 responses) carried out a regular exercise, but a sizeable minority (4 responses) had only carried out a single 'one-off' exercise. This is consistent with published examples in manufacturing and other sectors.

What cost drivers did you identify for central costs (library etc.)?

A wide variety of cost drivers was mentioned in the survey; most responses (as expected) gave examples rather than full lists. The drivers most commonly quoted were number of students (9

responses), number of staff (8), space occupied (7), and various forms of income (6). It was not always clear whether 'number' was simply a headcount, or some weighted or full-time equivalent (FTE) figure, but some respondents made clear that they used both headcount and weighted figures for students and staff. The other drivers quoted included, for example, numbers of courses, computer logins, library usage statistics, financial transactions, undergraduate applications, and room bookings. It was interesting that a high proportion mentioned some form of income as a driver (eg. HEFC income). Income is of course used commonly as a convenient acceptable approach to spreading overhead (and pain) over those who can afford it rather than those who actually cause it. However, from the comments made, income seems to have been used in these exercises as an easily measurable proxy for other drivers, for example number of financial transactions.

Were there any central costs without identifiable drivers? (ie. fixed or core costs)

Of the 10 with clear responses, 8 said yes, often providing examples, all of which included 'central management', 'directorate' or some similar expression. Other examples included Finance, Personnel, Professional fees, Security, Fund raising, and Management information services. As far as one could tell from the responses, all these core costs were then allocated to schools by non-ABC methods, using some agreed base linked to the size of the school (staff, students, revenues, etc.).

Allocation of central costs was down to what level?

Of those 10 that clearly stated their allocation method, only 1 allocated central costs directly to course level. The other 9 allocated central costs to schools (6 of these then allocated from schools to a lower level, losing some of the detail of the original allocations from the centre). This focus, on allocation to schools, is of course consistent with the stated objectives discussed above.

Did the exercise also extend to the allocation of school costs?

Half of the respondents (6 responses) said that they did allocate school costs, but for this allocation, very few drivers were identified, and there was no stated concern about core costs.

Was the exercise worthwhile?

11 of the 12 respondents thought that it was worthwhile, with one reserving judgement. A wide range of benefits was mentioned, in particular the greater understanding and awareness of cost within the university. A wide range of problems was also mentioned. Overall, respondents had positive views, but these were sometimes tempered with caution. The detailed benefits and problems noted are as follows:

<u>Benefits Noted</u>	Responses by Category: <u>Total</u> <u>3</u> <u>2</u>		
Improved awareness/knowledge/understanding of costs (This included in particular the improved understanding by schools.)	6	3	3
More rational/equitable allocation to schools (This included mention that it is seen as fairer than top-slicing, and leads to a more equitable distribution of resources)	4	2	2
Central services more accountable (In particular, this involved schools questioning the levels of central cost and the quality of services.)	3	2	1
Aids decision making	2	2	-
Incentive for management to generate surplus	1	-	1
Identified areas for improvement	1	-	1

<u>Problems Noted</u>	Responses by Category: <u>Total</u> <u>3</u> <u>2</u>		
Agreeing drivers (This included agreement on the number of drivers (trading off simplicity against accuracy) as well as the types of driver used)	3	2	1
Time and cost of exercise	2	1	1
Lack of understanding of methods (This included mention of the need to educate schools)	2	1	1
Lack of support/ co-operation	2	-	2
Lack of common database	1	1	-
Depreciation of capital items	1	1	-
Concern over separation of fixed v. variable costs	1	1	-
Middle management anxieties	1	1	-
Finding easily measurable drivers	1	1	-
Dealing with 'extra' time put in by academic staff on research	1	-	1
Concern that measures are rudimentary	1	-	1
Acceptance by schools of base entitlements for central depts.	1	-	1
Lack of confidence in results based on sampling	1	-	1
Agreeing apportionment of fixed/core costs	1	-	1

<u>Views expressed</u>	Responses by Category: <u>Total</u> <u>3</u> <u>2</u>		
Need more drivers	2	1	1
Important element is estates cost and space charges	1	1	-
There was a lot of data available	1	1	-
Should avoid temptation to get too sophisticated	1	-	1
Should proceed cautiously	1	-	1

As a final element in the examination of the survey results, it was considered whether there was any obvious distinctive factor about the ABC users. The answer appears to be no. Of the 12 institutions, four were 'new' universities (formerly polytechnics), four were self-contained 'old' universities, four were constituent colleges of the University of London, and one was a constituent college of the University of Wales.

The only unusual aspect was that Scottish universities were absent from the ABC users, whereas there were 8 Scottish universities in the 52 non-ABC users (the non-ABC set and the category 1 institutions from the ABC set). However with the relatively small proportion of institutions that used ABC, it is difficult to draw firm conclusions on this evidence. For example, even if the decision to use ABC was entirely separate from the location of the university, then randomly there is every possibility of this type of statistical result, given the wide range of geographical categorisations that could have been explored (Scottish v. other; East v. West, Urban v. Rural, and so on).

So, this issue aside, the ABC-set did seem to represent a broad cross-section of UK universities.

4.1.4 Commentary on the ABC set

Perhaps the most important results of the survey of these respondents were in terms of the stated objectives of the exercise and the objects to which central costs were allocated using the ABC methods. The majority saw the objective as being to allocate overheads to schools, with only a minority concerned with the costing of courses. This is interesting in that the dominant objective expressed in the ABC literature is that of product costing (leading to product-related decisions), with allocation from central services to 'production' departments as a step in the process, rather than an end in itself.

This perhaps suggests an important distinction between universities and other organisations, in that the central finance function tends to treat the schools as 'black boxes', with little or no view of the activities within these boxes. In a manufacturing organisation, the finance director would be very much concerned with product profitability and product decisions, eg. receiving regular printouts with product-level detail. In a university, it would appear to be rare to find a finance director examining costs and revenues on a course by course basis (and then perhaps initiating a finance-driven debate about changing the course mix or the course design). The university is in effect therefore operating like an industrial conglomerate, where the top level of management views the organisation as a federation of semi-autonomous units, and where each subsidiary is allowed to operate with some financial freedom, provided the overall (financial) performance of the subsidiary is acceptable.

If a major potential benefit of ABC is in terms of product decisions, then it could be argued that in the existing organisation of universities, these decisions are being made at school level, so perhaps this is where ABC should be utilised. However, the survey comments indicated that school

managers have usually little knowledge of cost issues. Without an understanding of cost behaviour (ie. cause/effect relationships) in both the school and central services, a full ABC analysis at this level would therefore be impracticable.

The key concern behind the original development and use of ABC, in manufacturing and services, and the focus of much of the literature, was the rational allocation of central overheads to products, so as to improve decision making relative to products and to sharpen focus on their cost constituents. On the way to this goal it was often appropriate to allocate service department costs to 'production' departments on the basis of use of services. However, when a product clearly consumed a central resource then allocation would usually be directly to the product (via cost pools), rather than via intermediate departments.

The university respondents (in general) have started from a different perspective, with the quest to determine a rational allocation of central overheads to schools. If this were the sole or primary purpose of the exercise, then the objective would be achieved by any method that charged the schools approximately what they use in terms of resources. In this sense it would appear that Manchester and others like it have rightly rejected the complexity of ABC, when simpler methods achieve the goal, at lower cost, and with greater transparency.

Referring briefly back to the non-ABC set of respondents, it would appear that they also shared this perspective, and saw the primary goal in allocation to be from central costs to schools, with the potential role of ABC being limited to improving such allocations. So those that did see a need for allocations may have ruled out ABC, if conventional multiple-base methods seemed adequate for the purpose.

Before moving on from the purposes of cost allocation, it should be noted that the 'ultimate' purpose was often to establish the existence of a surplus or deficit for schools. The implication of this is that in addition to cost allocation, there also has to be a means of establishing the income for a school. Given that generally the majority of income enters the institution centrally via government funding, there arises a need for income allocation. With greater transparency in funding, the incoming funds can often be ascribed to particular products or activities according to the funding formulae, although universities are of course not constrained to allocate according to this pattern.

It is difficult to judge what level of sophistication was involved in some responses to the question about core costs, but, based on the comments made, it would appear that this was at two levels:

1. At the lower level of sophistication (in ABC terms), the institution perhaps simply embraced the philosophy that 'in the long-term, all costs are variable', and allocated on some reasonable base, thus responding "No, we didn't have any core costs without identifiable drivers".
2. At a more sophisticated level, after careful consideration, many of the central costs might have been seen as fixed (long-term) and not activity-related, thus giving a response of "Yes, we had a problem identifying drivers".

It is conceivable that at a lower level of sophistication, the 'Yes' response was simply because of an identification of purely short-term fixed costs, or that at a much higher level of sophistication, the view was that although 'in the long-term, all costs are variable', even so, the long-term cause-effect relationship is non-proportional or non-linear (so that 'Yes' refers to the fixed element in the relationship). The survey comments however indicated some reasonable (but only that) level of sophistication, so it was considered unlikely that these were the motivations for a 'Yes' response.

A number of benefits were quoted in the survey, most of which related to the interface between the centre and the schools, and which were not particularly linked to the sophistication of the ABC methods. The most frequently quoted benefit was that of improved awareness, knowledge and understanding of costs; in the comments made, one could often detect a sense of relief by finance officers that general cost issues were now being taken more seriously as a consequence of the allocation exercises. A second key benefit was that the allocation processes to schools were accepted as more rational and equitable; in general, schools seemed to be supportive of allocation systems because they were transparent and also because they were perceived as fairer than top-slicing.

There was less consensus on problems noted. The most common problem was getting agreement on drivers. The underlying difficulty seemed to be establishing a compromise between the desired accuracy of the process (with more analysis and more drivers), and the desired simplicity (so as to limit the time and cost of the exercise, and so as to produce an easily understandable result).

Respondents had the opportunity to express any other views about ABC methods. There was no real consensus here; for example views that over-complexity should be avoided were balanced by views that more sophistication was needed.

In summarising the 'ABC' responses against the research themes, and also incorporating the points from the non-ABC set, the following can be noted:

Theme 1 - The HE context for ABC:

It was clear that the 'black box' view of schools was a dominant philosophy, both from the stated objectives, the level of allocation of central costs, and many of the detailed comments. What was not clear however was why so many universities took this viewpoint, and in particular why their finance officers were satisfied by this 'macro' view of school costs. A related concern as to the relevance of ABC in this context is that there was evidently a lack of costing knowledge at school level, yet it may be at this level that the ABC analysis may be most valuable in terms of product decision-making. In considering the relevance of ABC in a university there is clearly a need to recognise the differences between institutions in terms of organisational structure and devolution, but also in terms of the culture, in so far as it may differ from a stable 'collegiate' resource-allocation model to a commercial, cost-focused and market-driven model. Another related contextual aspect was that in parallel with approaches to cost allocation, there were potential issues relating to the allocation of income where devolution had moved to the establishment of surpluses/ deficits for schools.

Theme 2 - The purposes of cost allocation:

Consistent with the context, the dominant purpose of the ABC exercise was to allocate central services and overheads to schools, to establish surpluses/ deficits, and to support resource allocation. Only a minority saw the exercise as primarily concerned with product-level decision making, and there was no clear statement of the potential use for cost management in central services.

Theme 3 - The costs to include in the analysis

Based on the purposes of the exercise, the costs were generally those of central services, central management and overheads. The major finding here was that the majority identified fixed or core costs for which no activity drivers could be identified. These invariably included central management costs.

Theme 4 - Carrying out the ABC exercise:

There was a range of concerns, but broadly they related to the complexity, time and cost of the exercise. These views have of course to be taken in the context that many exercises had the relatively modest goal of improving allocations to schools, so cost and complexity were presumably being assessed by comparison only to the benefits arising from this goal. The restriction, to schools, for cost objects receiving allocated cost, is distinct from the usual interest in product-level allocations in the ABC literature.

Relatively few respondents were concerned with allocations below school level, so there is no

particular evidence of issues arising at this level. However the difficulty in allocating academic staff time had been mentioned by four of the non-ABC respondents, as a factor preventing an ABC exercise, and this point was echoed by one of the ABC respondents (who wished to remain anonymous) who gave this problem (paraphrased):

"Suppose that a member of academic staff has a contract to do the following: Teaching 60%, Research 30%, Other 10%. However, because of the 'extra' time put in on research by an active researcher, the actual split is: Teaching 50%, Research 45%, Other 5%. Which of these apportionments should we use?"

We mentioned earlier (in connection with the four 'category 1' institutions) that the difficulty of allocating premises costs might be a factor deterring detailed consideration of lesser costs. It is apparent that the difficulty of allocating academic costs might have similar consequences, ie. it self-evidently could hinder the analysis of school costs (which are dominated by academic staff costs), but also it could deter the development of sophisticated allocation systems for what are perceived as lesser costs within the university.

Theme 5 - Consequences of the ABC exercise

Overwhelmingly the exercise was considered worthwhile, in terms of use of the ABC data for the original objective, ie. generally of allocation to schools, for example to set budgets or to calculate surpluses. The level of detail was generally not sufficient (and not designed as such) to facilitate product level decision making, and (consistent with this) there was no general evidence that such use was being made of ABC results.

A majority listed other benefits arising from the results of the exercise, in particular increased organisational awareness of cost issues, and some pressure for central services to be more accountable, given the new visibility of their costs. This pressure was apparently within the 'black box' context, in that schools were considering service departments also as black boxes, comparing costs allocated to service provided. There was no evidence of ABC data being used to help manage the internal processes of central services.

Theme 6 - Alternatives and complements to ABC

As practised, most of the ABC users were not using the 'textbook' approach to ABC, but a hybrid where ABC methods were used only to allocate central costs to schools, perhaps equivalent in an industrial context to allocating service department costs to profit centres, but not to products.

While one respondent mentioned the creation of an incentive for school management (to create a

surplus), the majority did not express such a behavioural objective, but talked instead of concepts like 'fairness' and 'identifying areas of cross-subsidy', in relation to use of central services and resources. In this situation, it is perhaps not surprising that issues like capital costs (and depreciation) and opportunity/market costs were scarcely mentioned.

The general approach by these respondents was to use ABC at a 'macro' level to improve organisational efficiency by improving the knowledge of the cost/resource relationships between departments and schools. It was not generally used as a tool to increase efficiency within those units, so evidently this was achieved by other means, and was another issue that could be explored further in the interviews.

4.1.5 Moving Forward with the Themes

The survey provided important insights into how UK universities perceive the potential use of ABC in their specific context, and added some empirical detail to each of the themes. Some of the findings raised new questions, or required confirmation of tentative conclusions from the survey results. The translation of these needs into a set of questions for the interview stage is documented in the Research Methodology. The results of this interview stage are considered in the next section.

4.2 The Interviews

4.2.1 The Initial Interviews

The four initial interview responses were reasonably consistent, albeit with some variations due to the specifics of the institution or to the experience/ views of the interviewee. There was no evident difference between the views from old versus new universities, or from ABC versus non-ABC users. The results of this part of the research are presented below in the same sequence of questions as asked in the interviews.

Question 1: Why do you think that finance officers prefer the 'black box' approach to schools?

All interviewees responded similarly to this question, making the following main points, linked to the history and culture of universities:

- The organisational structure of a university involves schools having (and wanting) autonomy.
- The finance function is organised for financial accounting, and not management accounting.

- 70% of costs are staff-related, with little scope to change it, so the focus is on controlling staffing establishment at School level.
- There is no clear link at course level between costs and the revenues from funding councils (thus there is no clear definition of the profit or loss from a course).

When prompted, the interviewees all considered that this situation was unique to universities, and was not a general issue in either the public sector, or in terms of CIPFA-oriented training. A contrasting example quoted was that of local authority control of FE colleges, where the CIPFA/public sector context sometimes involves course costing at a very detailed level. One interviewee also compared the situation to his own experience in the British Army, where there had been historically very little interest in cost issues, but where funding pressures eventually led to greater interest, for example in terms of devolving cost management.

Question 2a: In your institution, do budgets for central services (like the library) take account of changing demands?

None of the interviewees' institutions had 'flexible' budgets defined relative to drivers like student numbers, and the overall picture was that budgets were negotiated and were relatively stable. One interviewee stated that a working party on library expenditure had made its recommendations by comparing to national averages, eg. on expenditure per student and expenditure as a percentage of university funds. At one institution, some flexibility was built formally into the library budget, by linking to university income, so that indirectly there was a link to student numbers, and particularly to the number of students from overseas with higher fee levels.

Question 2b: In your institution, how are central services encouraged towards greater efficiency?

In general, interviewees indicated that this was problematic, and this was partly attributed to the lack of detail in terms of the expectation of service levels. Two of the institutions allow their libraries to vire between staffing and other expenditures (eg. book stock purchases), thus providing an incentive to avoid waste. No-one mentioned performance targets or efficiency measures. As with schools, the impression was of a 'black box' approach, with attention from finance to the overall inputs and outputs, but not to internal processes, eg. those involved with inter-library loans (library), or course applications (registry).

Question 2c: In your institution, are the costs of central management seen as fixed, or potentially linked to drivers like numbers of students, staff and courses.

The unanimous response was that the costs of central management are fixed, and not linked to drivers. Some other expenditures were seen as fixed also (relative to potential drivers), for example 'corporate' marketing, and, in one case, a museum operated by the university.

Question 3a: Why do institutions generally allocate academic staff to schools using establishment headcount rather than as an expenditure budget?

The overwhelming response was that the key reason was to maintain stronger control over school staffing from the centre, supported partly by means of a central personnel department. In effect, schools were not trusted, and potential problems were mentioned of:

- Schools might reduce staffing, spending the budget on higher-paid staff, or viring to other expenditures.
- The university could end up with pools of funds over which it had no control.

The interviewees' attitude to this was not particularly to defend this position, but rather to explain it. One interviewee pointed out that the approach was in strong contrast to the way he saw industrial/commercial organisations moving, with for example decreasing roles for central personnel functions.

Question 3b: Why do institutions generally allocate premises as space allocations rather than as expenditure budgets?

The general view was that the reasons were historical, and that there had not (in the past) been any pressure to change. In fact, all four of the institutions visited had examined the possibility of moving to some sort of charging system, apparently largely driven by pressures on funding. Two institutions had decided not to charge, because of the perceived difficulties/ aggravation, for example where premises of different age or quality were involved. The other two institutions were introducing charges.

Question 3c: In general, is the scale of academic staffing and premises costs so large as to create little interest in the use of sophisticated allocation systems for other costs?

While the interviewees considered that all institutions (and finance officers) were fully concerned with the level and detail of 'other costs', the overall impression was of a positive response to this question, ie. in terms of the lack of interest in sophisticated allocation of these costs. One respondent for example thought that universities were generally satisfied with the use of top-slicing to cover such costs, and another pointed out the difficulties of separating out what people do, in support of allocations.

Question 3d: Given that premises are generally a scarce resource, why is there apparently little interest in opportunity or market costing?

The reasons given were that the situation is largely historical, reflecting the relatively stable position for land and buildings, and the lack of pressure to change. One interviewee also suggested that the added complexity in reconciling school accounts with university accounts would also be a deterrent. Of the two institutions that were in process of introducing charges for space utilised, one of these intended to use average costs for the basic space allocation, but market rates for any excess, on the rationale that the university does have to pay these rates for overall incremental usage.

Question 3e: In your institution, how are schools encouraged to use premises efficiently?

Apart from the use of funding council norms to set reasonable space allocations, and a certain amount of monitoring of usage, in general schools were not provided with incentives for greater efficiency. However, the two institutions implementing charging systems did expect this to act as a stimulus to efficient usage.

4.2.2 The Final Interview

For the final interview, firstly it was confirmed (as stated in the survey response) that the ABC exercise had been to establish school-level allocations of overheads. This had been driven by pressure from some schools, and the ultimate purpose was to confirm (and then reduce) suspected cross-subsidisation. The survey response had indicated an ABC exercise of medium sophistication, and this was confirmed in that although a range of drivers was used overall, most costs had been allocated using a single driver, there had been only limited activity analysis, and HEFCE income had been used for allocating many 'corporate' costs as a convenient non-ABC allocation base.

The exercise had been successful in the sense that the cross-subsidies had indeed become visible, however there were two factors that meant that success was not achieved in terms of the ultimate purpose:

1. There was little scope to rectify the cross-subsidies, in that those being subsidised felt that there was nothing they could do, given particularly the long-term nature of staff contracts.
2. A parallel problem was the choice of method used to allocate HEFCE income. The university had chosen to allocate this internally according to the HEFCE funding formula, and this approach had been seen as arbitrary by many schools.

One of the survey comments had been that "central services [were] more accountable", and this was explored further in the interview. It transpired that there had indeed been pressures on central services, but that these had not been particularly productive. For two services the problem appeared to have been the choice of only a single driver, so that the arguments centred on the perceived high cost per unit of this driver (Book borrowings in the library and financial transactions in the finance office). For another service, the debate centred on the choice of driver, in that some schools saw this as unrepresentative of the work actually done by the service, leading to what were seen as unreasonable cost allocations.

Premises charges were unexceptional, in that they were based on operating costs and depreciation, and were considered comparable to market rentals. An interesting development was that the university had moved from a shortage of premises to a surplus (due to organisational changes, rather than a consequence of charging), but it was too soon to assess whether this would create revised perceptions of the charges.

A final point was that, within the context of other organisational changes, the ABC system had been temporarily suspended, with a reversion to the traditional approach of setting budgets and allocating staffing according to 'establishment' needs.

4.2.3 Commentary on Interview Results

In terms of the research themes, the interview responses can be summarised as follows:

Theme 1: The HE context for ABC

The responses reinforced the 'black box' view of the organisation, with some clear reasons for this structure, for example the desire for autonomy by schools. The other main contextual point made was the dominance (in cost terms) of labour costs (particularly academic staffing) and premises. Both were viewed as relatively fixed, and also complex to allocate below school level. The continuing high proportion of labour costs is an important contextual issue, as it makes the university different in cost structure from most large-scale manufacturing or service industries. A final point concerns income, in that (as raised in the survey) the interviewees were aware that regardless of the sophistication of cost allocation, there was a parallel uncertainty in the allocation of income, whether to schools or to products. With this uncertainty in school/ product income (and thence in the surplus/ deficit), there would evidently be little purpose in excessive refinement of the

cost allocation mechanisms.

Theme 2: The purposes of cost allocation

Given the contextual factors, it is perhaps not surprising that cost allocation systems have been unsophisticated, with often a preference for a rationing/negotiation approach for staff, premises and other resources. Where ABC has been used, it appears generally to have followed a related approach, with allocations at school level aimed at arriving at a truer picture of resource consumption, and thus a 'fairer' assignment of the cost of resources to those (schools) who consume them. The purposes were apparently restricted to this level, with little interest by the interviewees in using ABC for product-level detail (eg. course design) or cost management within schools/ departments.

Theme 3: The costs to include in the analysis

There was confirmation that some central costs (in particular central management) were seen as fixed, without a link to drivers. As the purpose was apparently to provide a 'fair' allocation of central costs to schools, then of course these fixed costs were not a problem, provided that a 'fair' means of allocating them could be agreed. Fixed costs would only have become a challenge if the purpose of allocation was extended beyond this. The interviewees suggested that other fixed elements may occur within the institution (eg. the 'corporate' element of marketing costs), and this raises the possibility that such fixed elements may arise in some degree within all areas of cost within the institution, for example in support services like the registry and the library.

Theme 4: Carrying out the ABC exercise

The dominance of academic staff and premises costs, combined with the general purpose of 'fair' allocation to schools, did appear to deter interest in sophisticated allocation approaches for what are minor components of total school cost. The linking of library expenditure budgets to university income (see theme 5 below) raises a concern about the applicability of ABC, as it challenges the underlying assumption that expenditures are ultimately driven by demands on resources as represented by levels of operational drivers.

Theme 5: Consequences of the ABC exercise

One of the expected consequences of an ABC exercise is the long-term reduction or redeployment of resources released. It would appear that because of the linkage of expenditure to university income, this consequence would not necessarily occur.

The final interview gave some insight into the adverse reactions of some schools to the ABC allocations. The problem appeared to be that while the finance function simply wanted enough sophistication in the costing methods to arrive at an approximate *aggregate* allocation to each school, the schools themselves challenged the *individual* allocation elements. These were not accurate (or even fair) individually because of the coarse nature of the cost mechanisms (in particular reliance on a single driver, and weakness in the relationship to activity levels).

Theme 6: Alternatives and complements to ABC

The key finding was the growing interest in efficient use of premises, triggered it seems by the increasing pressures on capital funding. The move to a charging process makes the total cost of a school more clear. However it was evident that another motivation for considering charging was to provide schools with an incentive to make more efficient use of premises space. One of the institutions implementing charging systems did intend also to make use of opportunity/market costs for at least part of the overall charge, explicitly to deter use of premises beyond agreed norms. That a university may move between surplus and scarcity of premises was evidenced by the fifth institution, which provides a caution in the use of short-term opportunity cost valuation when addressing long-term cost issues.

Premises aside, there were no evident cost mechanisms to measure or encourage internal efficiencies, other than the authority in some cases to vire expenditures. Although there was no general intention to use charging for behavioural purposes, the strong reactions to perceived unfairness in the fifth institution are evidence of the potential role of costing in influencing behaviour.

4.3 The Statistical Analysis

4.3.1 COPOL 1991/92 Data ('New' Universities)

The first step taken with the COPOL data (the 'new' universities) was to perform a regression of Total Library Expenditure (TE) on all the driver variables under consideration, and to calculate all cross-correlations, using all 32 observations in the data set. The full list of variables was as follows:

Potential drivers

AC	Academic staff (Teaching and research)
PG	Postgraduate students
UG	All students except postgraduate (ie. largely undergraduate)
OE	Other institutional employees (ie. non-academic)
EB	Registered external borrowers
FTE	Full-time equivalent students (FTE's)
GF	Institutional income from central government grants and fees

Costs that are driven

SC	Total library staff costs
ME	Total materials expenditure
TE	Total library expenditure (SC + ME + other expenditure)

The initial goal was to finalise the data set, to establish a baseline for comparison with other regressions, and to seek any indications of useful driver variables. (Note that details of this and much of the subsequent statistical analysis are in Appendix 2.) This first analysis led to the exclusion of variable EB, in that it had no significant role in the relationships, and the exclusion of one very large university (Manchester Metropolitan) because of the excessive distortion it caused to regressions by 'leverage'.

This left a data-set of 31 observations and six driver variables: FTE, GF, AC, PG, UG, and OE. The key results of the regression on these variables were as below (reference R01), and some initial impressions from these results were:

- There was a constant term which was non-trivial in relation to the size of the dependent variable.
- GF (Income from grants and fees) and OE (other employees) appeared to be as significant as FTE in helping to predict TE.

Regn Ref	Dep Var.	Indep Var	Estimated Coefficient	p-value	R ²	Adjusted R ²	Std. error of estimate
R01	TE	Constant	121064	0.378	0.827	0.783	191,245
		FTE	54.15	0.220			
		GF	0.1547	0.034			
		AC	207.5	0.394			
		PG	34.19	0.689			
		UG	-16.05	0.463			
		OE	443.5	0.098			

Notes: Regn Ref: Regression reference used in the analysis
 Dep Var: Dependent variable being estimated
 Indep Var: Independent variable (or constant term) used within the regression equation
 p-value: Probability that the value of the coefficient could have arisen by chance
 R²: (R squared) The coefficient of determination. This value of 0.827 is the maximum value of R² achievable from any subset of these variables

The next step in the COPOL analysis was to examine the correlations between pairs of variables in the sample. The correlation coefficient measures the closeness of fit of a simple linear regression between two variables, thus it has weakness in that it can indicate poor values (around zero) even where relationships are strong, but either non-linear or involving several variables simultaneously. All the same, it is a useful exploratory tool, and large values (near to 1 or -1) do indicate strong relationships.

The results of the correlation analysis were as follows:

	TE	AC	PG	UG	OE	FTE
TE	1					
AC	0.651	1				
PG	0.404	0.409	1			
UG	0.585	0.619	0.260	1		
OE	0.826	0.582	0.338	0.469	1	
FTE	0.834	0.714	0.379	0.827	0.768	1
GF	0.847	0.569	0.367	0.633	0.764	0.829

Looking down the column marked TE (Total Library Expenditure), it can be seen that the highest correlations are associated not just with FTE but also with OE (Other Institutional Employees), and GF (Institutional income from grants and fees). Anyone familiar with an academic library knows that the total usage by 'other employees' is fairly low relative to the total usage by students, so that in

a conventional ABC exercise, concerned with activity levels and resource consumption, this variable would probably not appear as a key potential driver. Similarly GF is not a measure of activity or resource consumption at all, so would not be considered as a cost driver in the ABC exercise. Further discussion of this is deferred to the next chapter, but meantime it needs to be recognised that these two variables may be as important as any other in predicting the expenditure levels in a library.

The correlations of two of the components of total expenditure (SC and ME) were also examined, relative to driver variables, in case a strong relationship with one of these components (eg. staff costs) was being masked by the aggregation in TE. However this did not appear to be the case, as correlations were broadly in line with those of TE.

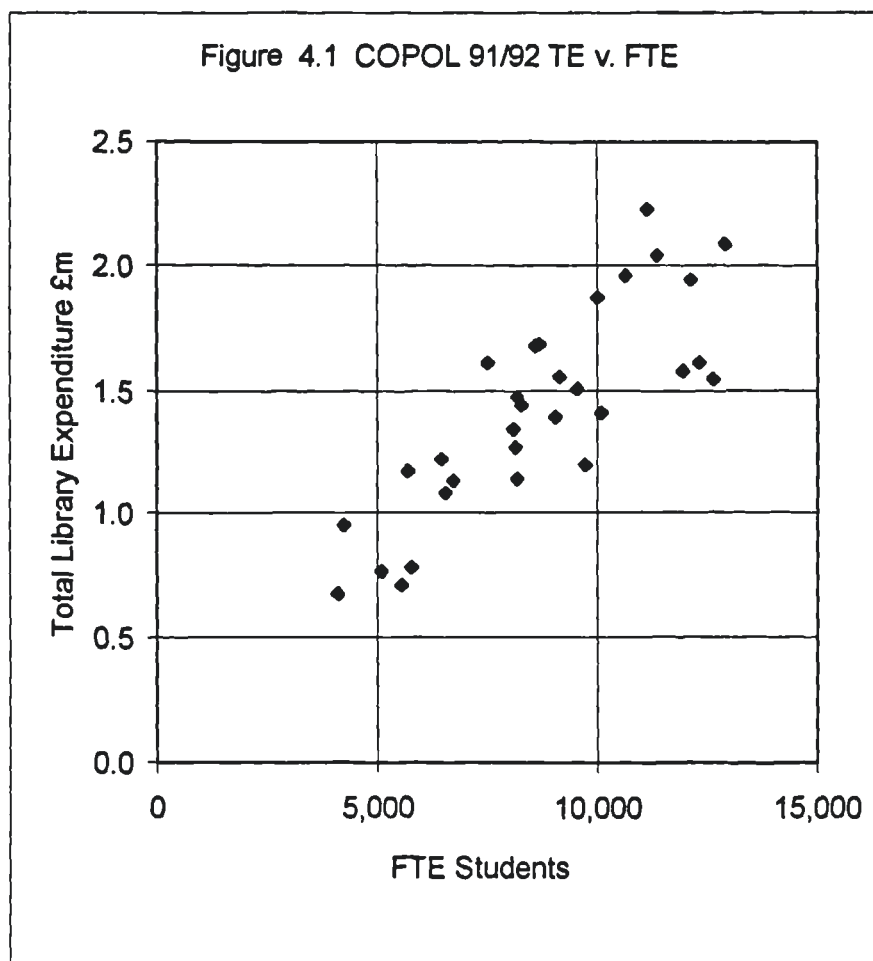
Another useful part of any correlation exercise is to examine cross-correlations, that is correlations among the driver variables themselves. A strong correlation (nearly 1) indicates that the two variables are closely linked, and that a regression that contains one of these variables could just as well contain the other instead; as a consequence, it may be pointless to include both variables, as they would simply dilute each other's effect. Conversely, a low correlation (near zero) would support a view that entirely different aspects were being measured, and so the use of each variable in a regression could be considered independently of the other.

As may be seen, in the correlations of driver variables, PG (Postgraduate students) had a relatively low correlation with the other variables, with a maximum of 0.409. The other five driver variables had strong cross-correlations with maxima of FTE 0.829 (with GF), and AC 0.714, UG 0.827, OE 0.767, GF 0.829 (all with FTE). This supported the decision to avoid stepwise methods (which are problematic when large cross-correlations are present).

Before proceeding to a detailed exploration of the COPOL data using linear regression, it was considered worthwhile to carry out a brief examination of two issues:

- Was there evidence for a constant term in the relationship?
- Was there evidence of non-linearity in the relationship?

To explore these issues, regressions were carried out, to examine more closely the relationship between Total Library Expenditure (TE) and the number of FTE students (FTE). This data is represented by the scatter diagram in Figure 4.1. This (visually) appeared to support the view of a 'standard' expenditure per FTE, within a reasonably homogeneous set of results. It appeared from the graph that there were no major economies or diseconomies of scale, and that the approximate underlying relationship was a straight line going through the origin.



The results of the regressions were as follows:

Regn Ref	Dep Var.	Indep Var	Estimated Coefficient	p-value	R ²	Adjusted R ²	Std. error of estimate
R02	TE	FTE	162.0	1E-25	0.668	0.668	236,783
R03	TE	Constant	241,207	0.121	0.695	0.684	230,881
		FTE	136.2	6E-9			
R04	TE	Constant	-367,365	-	0.715	0.695	227,135
		FTE	290.5	0.014			
		FTE ² /1m	-8961	0.172			

Notes: 1E-25 signifies 1 multiplied by (10 to the power (minus 25)) in scientific notation, ie. an extremely small value for the probability.

As expected from the scatter diagram, there was of course a strong relationship with FTE, evidenced by the extremely low p-value for FTE in the first two regressions. The p-value of a variable is the probability that the coefficient calculated from the sample could have arisen by chance even if there

was no underlying relationship in the population. In the regressions that follow, this is an important indicator as to whether a variable should be included in the regression. Ideally values were sought lower than 0.05, ie. so that there was at least 95% confidence that the effects were real and not spurious, but the evidentiary value was also accepted of values up to approximately 0.10, albeit at lower levels of confidence.

The introduction of a constant term from regression R02 to regression R03 inevitably improves (increases) the R^2 value (ie. the proportion of error explained, when compared with the use of the mean value of the dependent variable as an estimator). The 'adjusted' R^2 is a measure commonly used to take account of the fact that a degree of freedom has been removed by the addition of variables; in this case the adjusted R^2 for the second regression was still an improvement on regression R02. The introduction of a constant term also improved (decreased) the standard error of estimate (which measure also takes account of reductions in degrees of freedom). Thus there was evidence for the existence of the constant term. Although there can be difficulties associated with the consideration of p-values for a constant term, the (reasonably) low p-value in regression R03 perhaps gives some further reassurance.

So the first regression R02 (without constant) gave an equation:

$$\text{Total Expenditure} = 162.0 \times \text{Number of FTE's}$$

However, there was statistical evidence of a constant term in the relationship, giving a slightly better fit with this equation:

$$\text{Total Expenditure} = 241,207 + 136.2 \times \text{Number of FTE's}$$

The constant term in this result would indicate some economy of scale in this sector.

The (plotted) residual errors from regression R02 (the residual errors are differences between actual value of the dependent variable and the estimate produced by the regression equation) showed no obvious pattern of non-linearity. However, to test for non-linearity, regression R04 was carried out, with the inclusion of a further variable, the square of the FTE's (divided by one million). Although the p-value for the FTE^2 term was not significant at the 5% (or even 10%) criterion, it was not so large as to be easily dismissed, and both adjusted R^2 and standard error showed improvements. So there was some limited evidence of non-linearity (again supporting a view of economies of scale). However the relationship given by regression R04 seemed unrealistic (for example it would indicate that library expenditures start decreasing when FTE's exceed 16209), and possibly was a consequence of the influence of a few values. In fact with Manchester Metropolitan included, the coefficient of FTE^2 dropped from -8961 to -1021, and the p-value from 0.172 to 0.805. Therefore

the judgement on this was that while there was apparently some support for the existence of non-linearity, this support was easily challenged, and that overall there was not substantive evidence of non-linearity.

Returning to the wider exploration of the COPOL data, it was therefore considered justifiable to proceed on the assumption that a constant term could reasonably be included in regressions, and that consideration of non-linearity was not necessary unless indicated clearly by plots of residual errors.

Because of the existence of strong cross-correlations, rather than rely on step-wise methods, all possible regressions were evaluated (63 in all, using all combinations of the six variables). The issue then was to filter these down to a 'better' subset, and then continue the process to a 'best' regression. The process used a combination of R^2 and the p-values of coefficients, to arrive at a subset of relatively few significant variables, albeit explaining a relatively large proportion of the variation in total expenditure. The resulting 'best' regression was:

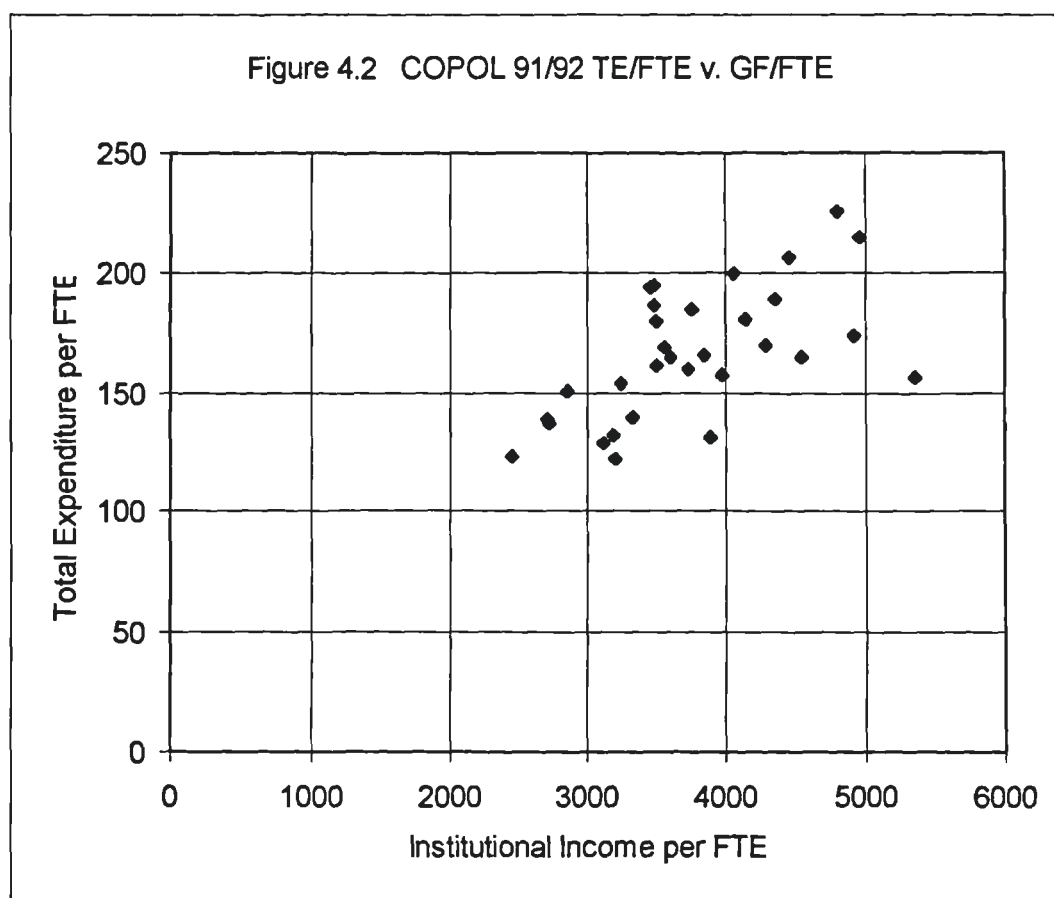
Regn Ref	Dep Var.	Indep Var	Estimated Coefficient	p-value	R^2	Adjusted R^2	Std. error of estimate
R28	TE	Constant	132471	0.298	0.815	0.795	186,212
		GF	0.01517	0.030			
		FTE	44.39	0.100			
		OE	553.2	0.020			

Thus the selected equation was :

$$\begin{aligned} \text{Total Expenditure} = & 132,471 + 44.39 \times \text{Number of FTE's} \\ & + 0.01517 \times \text{Institutional Income (Grants \& Fees)} \\ & + 553.2 \times \text{Number of Other Employees (Non-academic)} \end{aligned}$$

The residuals from this regression showed slight signs of non-linearity, but this was not significant when tested. The residuals also showed a pattern of larger residuals for larger universities. A set of regressions was therefore also completed on 'transformed' variables derived from the basic data variables (Dependent: Total expenditure per FTE (TE/FTE); Independent: Institutional income (grants and fees) per FTE (GF/FTE), etc.) in case the uneven distribution of residuals was distorting the regressions on the basic data. These new regressions in fact confirmed the equation above, albeit with slightly different coefficients.

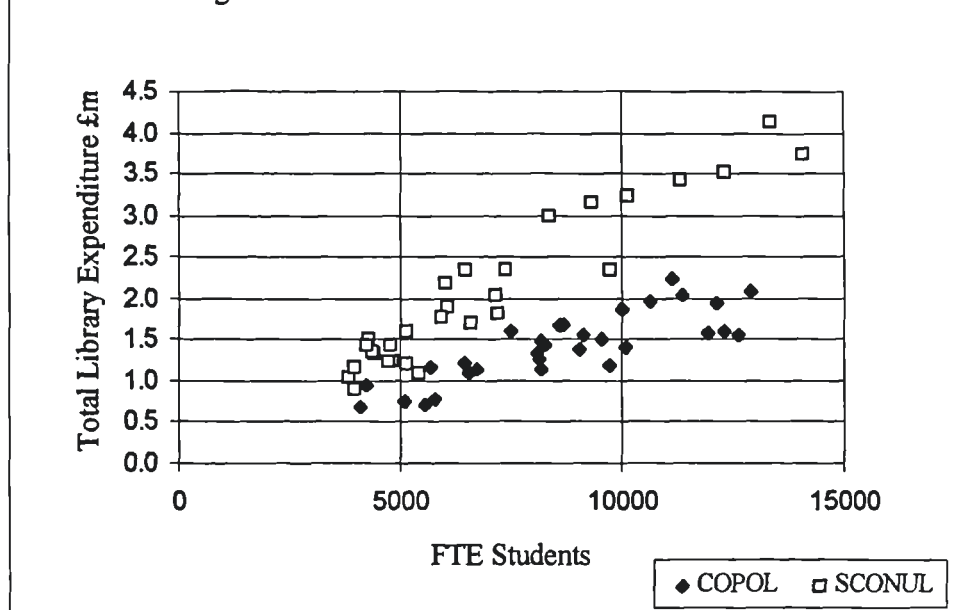
For the transformed data, as reflected in the scatter diagram (figure 4.2), Institutional income per FTE was consistently the strongest variable in the transformed COPOL regressions.



4.3.2 SCONUL 1991/92 Data (the Older Universities)

Figure 4.3 plots Total Library Expenditure against Total Number of FTE students for both the SCONUL and COPOL data. As with COPOL, the points on this diagram that represent SCONUL data, appear to belong to a reasonably homogeneous group, with an underlying relationship that appears to be linear with no constant term, and thus would support *the current practice of thinking in terms of constant expenditure per FTE across these institutions, without economies or diseconomies of scale.*

Figure 4.3 SCONUL & COPOL 91/92 TE v. FTE



As with the COPOL data, an initial analysis led to the exclusion of variable EB. The full regression using the data-set of 30 universities, and the remaining driver variables was as follows:

Regn Ref	Dep Var.	Indep Var	Estimated Coefficient	p-value	R ²	Adjusted R ²	Std. error of estimate
R82	TE	Constant	125198	0.472	0.916	0.894	300,225
		FTE	206.7	0.179			
		GF	0.001895	0.884			
		AC	431.2	0.440			
		PG	-95.68	0.531			
		UG	.859	0.995			
		OE	147.0	0.428			

The residual plots for this regression showed no particular evidence of influence or leverage, and no evidence of non-linearity, so that it was considered that the data-set was now suitable for further regression analysis. A correlation analysis was performed, with results as follows:

	TE	AC	PG	UG	OE	FTE
TE	1					
AC	0.929	1				
PG	0.717	0.736	1			
UG	0.934	0.939	0.689	1		
OE	0.851	0.817	0.629	0.832	1	
FTE	0.949	0.949	0.799	0.972	0.861	1
GF	0.926	0.970	0.805	0.920	0.843	0.957

As with COPOL, correlations of driver variables were also calculated with constituents of total expenditure (ie. staff costs and materials expenditure), in case a strong effect at this level was masked by the aggregation into the total. In fact all the correlations were worse than corresponding correlations with TE, so this matter was not pursued further.

The first impression of these correlation results was of values substantially larger than those for the COPOL data. Whereas the highest correlation with TE for COPOL was 0.847, all but one of the SCONUL correlations exceeded this. Similarly the largest cross-correlation for COPOL was 0.829, whereas more than half of the SCONUL values exceeded this. The conclusion from this set of results was that, even more so than for COPOL, it would be risky to rely on step-wise regression methods. Therefore, as before, all possible regressions were carried out.

In comparison with the COPOL results, the following were noted:

- R^2 was generally higher (matching the higher correlations)
- Standard error for SCONUL regressions was about 50% higher in absolute terms (although similar as a proportion of the dependent variable)
- The 'best' COPOL regression (GF, FTE, OE) had a poor p-value (for GF) for the SCONUL data.
- SCONUL p-values were generally poorer when the regression contained two or three variables (a consequence of higher cross-correlations).
- FTE was clearly the most important variable. The results with highest R^2 , whatever the number of variables, involved FTE as a constituent.

The filtering process on the regressions led to the following final regression:

Regn Ref	Dep Var.	Indep Var	Estimated Coefficient	p-value	R^2	Adjusted R^2	Std. error of estimate
R103a	TE	FTE	294.4	2E-27	0.901	0.901	289,869

The final selection of a 'best' equation for SCONUL was thus:

$$\text{Total Expenditure} = 294.4 \times \text{Number of FTE's}$$

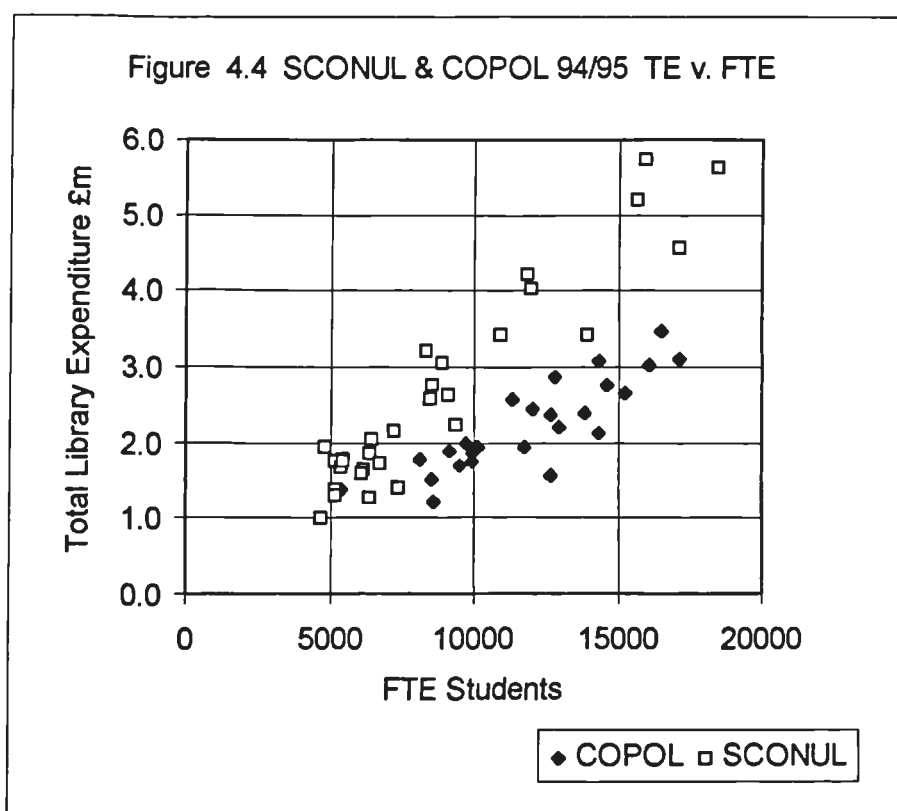
The strength of the FTE variable was evidenced by the R^2 value being nearly as large as the maximum achievable when all variables were included. There was no evidence for a constant term,

the addition of which caused deterioration in adjusted R^2 and standard error. In addition there was no evidence of non-linearity. As with COPOL, regressions were repeated with transformed variables, but consistent with the above equation, no variable was significant in explaining the variation in total expenditure per FTE.

4.3.3 1994/95 University Library Data

The 1994/95 data published in SCONUL (1996) covered all the institutions previously covered by COPOL and SCONUL. To enable a comparison with the 1991/92 data, the same institutions were selected (excluding a few with incomplete data) and these were separated into two samples corresponding with the old COPOL/SCONUL division. (In the following text, as in the rest of the thesis, 'COPOL' and 'SCONUL' are used with reference to the 1991/92 designations.)

The scatter diagram of library expenditure versus number of FTE students is shown in figure 4.4.



It can be seen that, compared with the 1991/92 scatter diagram in figure 4.3, both sets of institutions had expanded in terms of student numbers, and there had been a corresponding increase in library

expenditures. As before, apart from a few smaller institutions, there was still a clear separation between the two groups of institutions, although seemingly less pronounced.

In fact, a comparison of the sets of data gave the following average expenditure per FTE student:

	COPOL	SCONUL
1991/92	167	292
1994/95	192	298
Increase	15%	2%

The averages show a small narrowing of the gap between the two sectors. Allowing for the 8% total inflation over this period (UK retail price index from Jan 1992 to Jan 1995), this narrowing was in real terms the result of an increase in expenditure per FTE in the new universities, and a similar decrease in the old universities, in this sample. (The COPOL average was based on the 32 COPOL 91/92 institutions, but excluding two for which 94/95 data was not available. The SCONUL average was based on the 30 SCONUL 91/92 institutions)

Correlations showed a similar set of values to 1991/92, with, as before, the SCONUL correlations generally higher than the COPOL correlations. Regressions on the COPOL data gave similar results to 1991/92, although, the following were found:

- while there was still evidence for a constant term, it was less pronounced
- the dependence on GF (Institutional income from Grants and Fees) was less strong
- the choice of a 'best' regression was not as clear as with the 1991/92 data
- the 'best' (arguably) regression was that on PG (postgraduate students) and FTE

The results of the regressions and correlations on the SCONUL data, compared with 1991/92, were that:

- FTE was no longer so obviously dominant, with other variables now useful in predicting library expenditures, in particular AC (academic staff).
- variable UG (undergraduates) produced more or less similar results to FTE
- there was still no evidence of a constant term

In conclusion, in reviewing the 1994/95 results for both COPOL and SCONUL, it seems that:

- COPOL still shows evidence of economies of scale (constant term), whereas SCONUL does still not do so.

- COPOL still has some dependence on Institutional Income from Grants and Fees (as well as FTE), but less so than previously, whereas this variable still does not appear significant for SCONUL.
- COPOL and SCONUL are still distinct groups, but some of the causes of variation are perhaps now less distinct.

4.3.4 Commentary on the Statistical Results

The overall conclusion from the analysis is that while there is no consensus across the two sectors in terms of total library expenditure per FTE student,

- (a) There is some consensus in terms of expenditure as a proportion of institutional income. It could be argued that all these organisations spend what they have available, rather than according to the demands on resources.
- (b) Expenditure in the new universities, working at lower levels of income, is perhaps best explained by a combination of income and FTE's, with some evidence of economies of scale. Perhaps these institutions have had to find a balance between the pressures of limited income and the demands on resources.
- (c) Expenditure in the older universities can satisfactorily be explained by FTE's. Perhaps in an environment of less restricted income, it is the case that standard resourcing and quality of service become the norms for the group, regardless of institutional income.
- (d) There are indications that following the combining of these two sectors, their cost behaviours are becoming less distinct. This perhaps is unsurprising if it is accepted that the cost behaviours depend on the two contexts, which are themselves becoming less distinct.

The primary objective of the statistical analysis was to gain insight into how a conventional ABC exercise might be appropriate (or not) in the HE context. In terms of this objective, the key overall results of the analysis were:

- In one group of institutions (COPOL) there was clear evidence for a constant term, ie. for economies of scale. This would not be recognised in a conventional ABC analysis, which implicitly assumes proportionality.
- Non-linearity was not evidenced by the regression analysis. This would support the ABC implicit assumption of linearity, at least for this type of cost data.
- The regressions showed evidence (as expected) of the importance of typical 'driver' variables like the number of students and academic staff. However, they also demonstrated the predictive ability of variables not necessarily included in a conventional ABC exercise, eg. GF and OE.

- The regressions showed that the old and new university sectors differ not just in their library expenditure per FTE student, but also in the form of the cost relationships.

Although not related to the primary objectives of the analysis, some other results are of methodological interest:

- Regressions on raw data were influenced by the fact that residual variations to some degree increased with size of institution. Regressions on transformed data led to additional insights. This is a lesson for similar use of regression on this type of cost data. It would seem that in non-transformed data, important and meaningful variations in smaller institutions are given reduced influence on the results. This leads to a loss of information at the lower end, and in particular clouds judgement as to the existence and value of a small constant term.
- Single observations can have substantial 'influence' and 'leverage' effects, causing large changes in the resulting regressions. What was perhaps unexpected was that in transforming the data, some existing 'well-behaved' observations became problematical in terms of transformed values.
- While the regressions produced considerable insights, they did not produce a consistent 'best' view of the combined effect of several variables. In most cases, several alternative regressions with different combinations of variables produced broadly similar results. Therefore this approach does not seem viable as a means of supplanting conventional ABC analysis in a real-life situation when faced with the almost inevitable cross-correlations between variables. The best that can probably be hoped for is that regression results can draw attention to variables (and combinations thereof) which can be investigated in detail in a conventional ABC exercise.

In terms of the research themes, the findings from the statistical analysis make the following contribution:

Theme 1: The HE context for ABC

The process of arriving at budgeted expenditures for a university library leads to a funding that is perhaps influenced by university income, by external comparisons, and by competing demands for funds. The statistical analysis provides evidence that in one of the HE sectors (the new universities) in particular in 1991/92, university income was indeed one of the determinants of library expenditure. The analysis also showed that care has to be taken when discussing the 'HE context', as apart from the evident differences in expenditure per FTE student between the two sectors, there were also significant differences in the form of the relationship between total cost and the various drivers. This of course cautions us against assuming that these statistical results, based on UK evidence, can be translated unchanged to other national HE contexts.

Theme 3: The costs to include in the analysis

The survey and interviews made clear that some university costs were seen as 'fixed', ie. not linked to driver volumes. The statistical analysis showed that for one of the HE sectors (the new universities), a fixed element can be considered to be present in what might be supposed to be a proportional relationship between driver and cost. Thus there was evidence for economies of scale. In fact this external statistical analysis would not necessarily have detected economies of scale in the older universities (where no significant constant term was found), since even if economies had been obtained, they could have been utilised for extended opening hours, increases in acquisitions, and so on. The COPOL analysis suggested only a modest constant term, at best, within a lot of variation, so it is likely that this effect would be easily masked in the SCONUL data if there were such compensating increases in service level provision.

Theme 4: Carrying out the ABC exercise

An interesting problem arose here, related to the comments on context above. If library expenditure is largely driven by the demands from students or other library users, then one could justify a conventional ABC exercise, using drivers like number of students, number of staff, and so on (as consumers of service/ resource), in that it would produce realistic long-term estimates of the incremental library expenditure due to say an additional intake of students on a new course. However, the conventional ABC approach may be judged as inappropriate if expenditure is driven partly by university income, rather than just these drivers.

In this case, if for example there were no additional student numbers, but there was an increase of the proportion of 'full-cost' (high revenue) students, then overall average income per student would rise, and so therefore would library expenditure. If the total expenditure was allocated simply on resource consumption, then cost per student would have increased for all students. This issue is explored in the next chapter.

Theme 5: Consequences of the ABC exercise

The key issue that arose in terms of consequences was, as above, the link to income. The anticipated long-term consequence of an ABC exercise (and its consequent actions on product mix, cost management, etc.) is to reduce or redeploy any resources released. The partial link to income suggested that this reduction may not always take place.

Chapter 5 Thematic Analysis of Issues

The purpose of this chapter is to establish a knowledge-base concerning the applicability of ABC in UK universities, that builds on the published literature. The sections of the chapter match the themes identified from the literature review. In each case the empirical results are briefly reviewed, following which arguments are developed, based on the application of general costing theory to the HE context, and taking account of the empirical findings from this research.

5.1 Theme 1: The HE Context for ABC

In this section, noting that the context has an influence on the appropriate choice of costing methods, it is demonstrated that HE does indeed present a unique context for the application of ABC.

Within this theme, two main issues arose in the literature:

- The influence of context

Differences in context (organisation, technology and environment) lead to different costing systems, and the uniqueness of context of UK universities implies a possibly distinct role for ABC.

- Acceptance v. applicability

The relative lack of acceptance of ABC by UK universities, in spite of normative advice to them to use this method (eg. JFC 1997), is a 'positive accounting' indication that the methods may not be wholly appropriate, in this context.

5.1.1 The findings from the empirical data

It was apparent from the survey results that the organisational structure of universities had a strong impact on the use of costing systems. The typical university has a federal structure which comprises a set of semi-autonomous schools (or other academic departments and faculties), and a set of central service/ administration departments. The financial arrangements mirror this federal structure, in that each school or department is assigned a resources budget and then is largely judged in terms of financial performance as to whether the budget is adhered to, and perhaps for schools whether the income (mostly allocated centrally according to some agreed formula) achieves a surplus over expenditure. The survey showed that often no allocations are carried out at all, and that where

allocations were done they generally maintained the federal view of the university, and simply improved the sophistication of the external assessment of each school/ department, treating each as a self-contained 'black box' with inputs and outputs, but with no particular interest in the processes within.

Given this federal view of the university, there was an additional contextual issue that whatever purposes are served by cost allocation, these are conditioned by the parallel process of income allocation. In non-devolved institutions, this is largely concealed as an allocation not of money but of staffing and premises, whereas in devolved institutions, the allocation of income is more transparent. Where the purpose of cost allocation was connected with surplus/deficit or cross-subsidisation issues, it was evident that this was hampered by a lack of objectivity/ agreement over the allocation of income.

The interviews indicated that there were several reasons why the financial black-box viewpoint was the norm, not least the historical and continuing desire for autonomy by schools. The interviewees also indicated that they considered the situation to be unique, and specifically was not replicated elsewhere in the public sector.

A related contextual issue that emerged from the survey and interviews was the culture relative to costing. At the centre of the university the tradition was of financial accounting rather than management accounting, with no general availability of staffing resource (and perhaps expertise) to conduct costing exercises. In an industrial conglomerate with a federal structure, this would not be a problem if the staffing and expertise is available at divisional level. In a university, the parallel would be expertise at school level. In fact the survey and interviews indicated that such expertise is not generally available, to the point where a major barrier to adoption of methods like ABC was perceived to be the difficulty of getting schools to understand and accept the methods.

Both the survey and interviews confirmed the dominance of academic staffing and premises in consideration of cost issues, and the difficulty of allocating these costs below school level. The continuing high proportion of direct (academic) labour costs differentiates HE from the majority of industrial and commercial organisations, in particular those where ABC has been successfully implemented. The asset value of premises is considerable, but their long-term stability means that it is largely the operating costs (rather than capital values) that are given attention, and the stability seems to have led to simple rationing systems that vary little year to year. There was some evidence however that the pressure on capital expenditures in recent years is a new aspect of the HE context,

and is leading to a change in attitude to premises utilisation. Thus the stability (and longevity) of premises is a contextual difference compared to industrial/ commercial contexts, although evidence was that the gap may be narrowing slightly.

On the general issue of stability, the UK university sector contains considerable diversity. Some institutions have evidently passed through the 1980's and 1990's without significant change (eg. in organisation and product mix), while others have responded to external pressures by becoming market-driven and commercially oriented. While the latter may provide an appropriate and receptive context for ABC, it is to be expected that in those institutions that have not moved to this ethos, ABC may appear less obviously appropriate or useful. Many of the reservations expressed, particularly in the survey, would appear to be reflecting this viewpoint.

The interviews indicated that expenditure on library costs was partly driven by external comparisons, in particular on expenditure per FTE student. This again differentiates a university from industrial/ commercial organisations, in that for a university the expenditure per unit is seen as an indication of quality, so that pressure from comparisons is often to support an increase in expenditure, whereas industrial organisations tend to use comparisons to justify reduction of expenditure, ie. cost per unit is seen as a weakness rather than a strength.

The statistical analysis confirmed the influence of such comparisons, in the different cost behaviour between the two HE sectors (old and new universities). Institutions evidently compared themselves with their own peer group, as evidenced by the uniformity within each sector, and the disparity between sectors. Perhaps also related to such comparisons, the interviews indicated that university income was also a determinant of library expenditure, and this was confirmed strongly for the new universities in 1991/92 by the statistical analysis.

5.1.2 Analysis

In UK universities in the 1970's, much of the capital infrastructure was relatively old, or had been separately funded, so that revenue considerations could be largely addressed without concern for capital values. In the revenue accounts, income was fairly predictable, and costs were dominated by the labour cost of academic staff. Although academic labour levels took time to change, the environment and the market changed slowly anyway, so from a long-term perspective, labour levels could be matched to workload, and could be treated in effect as a direct labour cost. In this scenario,

allocation of indirect costs was a relatively minor issue, and allocation methods were simplistic or in some cases non-existent.

However, much of this has changed in the last two decades, and it is important to examine the new context, to effectively test whether older approaches are now less appropriate, and whether in particular ABC has a role to play. In fact a number of contextual factors are present in a university, each of which has an influence on costing methods like ABC. Following Belkaoui's (1989) classification:

(a) Organisation

- **Federal Structure**

The typical organisational structure of a UK university is federal, composed of semi-autonomous schools together with a set of central service/ administration departments. Financial control mirrors this structure, so that each school or department is judged largely by its inputs and outputs (as a 'black box'), with little interest from the central finance function in processes internal to schools/ departments. There are no indications that this is changing, and moves to devolution seem likely to strengthen rather than weaken this aspect. The survey evidence is that where ABC has been introduced, this aspect of context has been important, in that ABC has often been implemented simply to improve the calculation of the service-department inputs at school level.

- **Lack of product-level cost information**

A consequence of the federal 'black-box' organisation of the university is that there has been no tradition of product-level management information. For example, there is no general evidence of undergraduate degree programmes being costed in the same detail as a new industrial product, of regular annual reporting of the costs of the programmes, or of the capitalisation and expensing of the original development cost (mostly the time of academic staff) over the expected life of the programme. The new commercialism in HE, and increasing interest in costing issues by the funding councils, may cause a change in this availability of information, but as yet there is still a deficiency relative to commercial organisations.

- **Joint cost of academic labour**

Survey respondents confirmed that the allocation of academic staff costs below school level was seen as problematic. Some reasonably successful attempts have been made to resolve this, so there is no reason to see it as a barrier to an ABC exercise. However, there would certainly be a cost involved

in resolving this, and an issue of obtaining co-operation, which makes it all the more valuable to have a purpose which has a perceived value to those concerned. The semi-autonomous nature of schools has been noted, but one might also reflect on the semi-autonomous nature of individual academics within those schools!

- **Long-term stability**

In the business sector, long-term stability is unusual, not least in terms of growth or decline, but also in terms of relocations, mergers and demergers. In universities generally, the latter are rare (but not unknown) events, and rates of change are much more modest, reflecting the long-term stability of the market and perhaps the lack of incentive for profit and growth. The increase in total number of undergraduates in the last 30 years has been met as much by creation of new institutions as by expansion of existing universities. Thus long-term stability is a contextual feature of many universities. However, some universities have become market-driven and commercially oriented. In considering the value of ABC, it is perhaps therefore necessary to differentiate these market-led institutions from those that have retained an older ethos.

- **Under-valued capital assets**

One aspect of this stability is that the age profile of land and premises is often weighted towards older acquisitions, so that depreciation charges are low and market values unclear. Yet the capital assets are considerable, and for a commercial enterprise would be an investment on which solid returns would be expected. In contextual terms, it may be necessary to recognise that some 'stable' institutions will continue not to ascribe costs to premises usage at all, preferring simply to ration out according to need, that some institutions (without pressure on premises) will restrict their attention largely to operating costs, but that some (perhaps under greater pressures) will seek to value premises fully, and will charge/ allocate accordingly.

- **Joint cost of premises**

Where universities do wish to allocate premises costs (whether just operating costs or greater sums), there is a joint-cost problem of shared use of teaching facilities by courses. Traditionally there have often been no systems to monitor usage, and even where usage information is available, there are difficulties associated with differing size and quality of rooms and with day and time of usage. Premises are second only to academic labour as an element of total cost, so these issues are crucial to accurate product costing.

- **Lack of a management accounting culture**

The survey and interviews made clear that the accounting culture in universities was dominated by financial accounting. This presumably is partly a consequence of the long-term stability of these organisations, the lack of profit motives, and the federal organisational structure, eminently suited to budgetary control. In the centre of the university there appears to be relatively little provision for management accounting (and perhaps little expertise). With the general move towards devolution rather than centralisation, there are unlikely to be funds available to expand the central accounting function, so the position will presumably remain, at least until there is a demonstrable benefit to support an expansion of management accounting. In the absence of this expansion, the management accounting focus will move to schools and departments. Unfortunately, the evidence was that expertise is not normally available at this level, and that there are consequent difficulties in implementing complex costing systems.

- **Expenditure driven by income**

There was evidence that library expenditures (and one could presume other expenditures) are partly driven by the level of university income as much as by demand on resources. This could be compared with industrial/ commercial organisations, where it is possible that these too could spend more on central services when a greater overall level of income is available. This perhaps therefore is an issue for ABC generally rather than specific to a university. It may be however that the issue is more specific at least for library expenditures, if (see below) these are perceived as an external indicator of quality.

(b) Technology

- **High direct-labour costs**

Compared with most modern manufacturing and services, technology has had little impact in universities. University education is still very direct-labour intensive, even though the ratio of students to academic staff has increased considerably in recent years. There are no signs of this changing significantly in the coming decade, although the use of distance learning, computer-assisted learning, and learning resource centres may make some small difference, and be a foretaste of more significant changes in the longer term.

The literature shows that ABC has been particularly useful where the proportion of direct labour costs had decreased, and where a diverse product range was supported by an increasing base of indirect cost, and upon which each product made resource demands not necessarily reflected in

output volumes.

In universities, while the latter diversity can certainly be found (with course differences in subject, level, learning mode, etc.) and central indirect costs have increased relative to the costs of academic staff, this is still some way from the manufacturing cost situation. All the same, indirect costs have been increasing, and as the direct labour (academic staff) has been reduced, students may well have correspondingly used a greater amount of support services like libraries and computer facilities, so that cost-reduction decisions that concentrated solely on staff-student ratio (SSR) may have achieved little in overall cost terms, if 'fixed' institutional costs have risen to compensate. Thus while the direct labour content may not yet be low enough to overwhelmingly indicate the need for ABC, its role may become more important over time. Meanwhile, it could be that its role is more limited, for example for cost management if not for product design.

(c) Environment

- **Lack of product-level revenue information**

From an environment where funding matched needs, the situation now is more market oriented and competitive, with funding static or decreasing. What makes this situation distinct from most commercial organisations is that a large part of funding (for HEFC funded undergraduates) arises from a 'product' whose price is fixed by government diktat. The formula used for calculating this portion of a university's income assigns different amounts for students in different categories, but potentially set to meet governmental goals (eg. to encourage growth in science places) as much as to match real costs. The consequence, which is an unusual element of context, is that the university has no clear sense of a price for the product, relative to the cost of its delivery. Compounding the problem, the university also does not have a means to forecast product-level income more than a year or two ahead, since so much depends on political will (for example whether or not to expand HE provision). A final complication is that the same product (a course) can be sold to a non-EU student, largely according to what the market will bear. Thus the same product can have two 'prices' (one of which can be as much as twice the other) depending on the customers served. One of the interviewees pointed out that the lack of a clear link between the costs and income of products is perhaps one of the reasons why finance officers have retained their control at school rather than product level. However, even at school level there are similar difficulties in defining HEFC income. The allocation method for determining school income (whether directly in a devolved institution or indirectly via assignment of staff and resources) has been a judgmental (or arbitrary) choice, for example devised to meet certain institutional goals, or simply implementing the HEFC formulae

internally without consideration of localised or specific cost issues in schools. When ABC has been used to assess surpluses/ deficits (or to identify cross-subsidisation) its contribution has been compromised where the allocation method for HEFC income has not had universal support.

- **Non-profit goals**

A contextual issue that a university shares with some other public sector and charitable organisations is the absence of the profit motive. As with many other public sector organisations, financial goals are only a part of the overall set of goals, many of which are concerned with issues like status, quality and service to the community. This perhaps explains why there was traditionally no incentive for product-level costing, or for rationalisation of the product portfolio. Pressures on funding have now introduced an incentive for product profitability, but there is only limited evidence that this has resulted in action to improve the costing process.

- **Expenditure as an external indicator of quality**

In most commercial organisations an above-average expenditure would be seen as a problem to be solved. Contrast this with universities, where in some cases high expenditure is perceived as a sign of quality. This would not be the case with purely administrative expenditures, but is clearly true for libraries: for example expenditure per FTE student is one of the quality criteria used by the Times newspaper in ranking universities (THES 1995). This may also be perhaps the case for academic computer services, where, as with libraries, the external view may be that high expenditure is for resources and services of direct benefit for students, rather than a possible symptom of organisational inefficiency. Earlier it was noted that high library expenditure as a proportion of income could be similarly perceived as a sign of quality rather than inefficiency.

(Note: Although this is not generally a situation that faces commercial organisations, there is perhaps a possibility that a similar situation may arise in connection with expenditures on 'safety' and the 'environment'.)

5.1.3 Summary

In summary, these then are the elements of the context of a university that would appear to influence the applicability of methods like ABC:

Organisation	Federal structure
	Lack of product-level cost information
	Joint cost of academic labour
	Long-term stability
	Under-valued capital assets
	Joint cost of premises
	Lack of a management accounting culture
	Expenditure driven by income
Technology	High direct-labour costs
Environment	Lack of product-level revenue information
	Non-profit goals
	Expenditure as an external indicator of quality

Each university has a distinct history and culture, has its own local environment, and has its own ethos in terms of addressing external market/ funding pressures. So we would expect each university to be distinct in terms of the emphases between these different contextual factors, and we would also expect the emphases to change over time. However all the factors will normally apply in some form to any particular institution at any particular time, because of the overall influence of the UK HE environment.

In the themes that follow, costing issues will be considered within this context.

5.2 Theme 2: The Purposes of Cost Allocation

It is important to be clear about the purposes of cost allocation in a university, as effectiveness of a particular method (like ABC) has to be judged relative to these purposes. In this section, firstly there is consideration of the purposes as they arose from the literature review, and what further insights

have been obtained from the empirical data. There is then an examination of how ABC may have a role related to these purposes.

The following broad purposes for cost allocation arose in the literature review:

- Decision making

This includes product-level decisions (eg. pricing, design and product mix), and also operational decisions on budgets and deployment of resources within organisations.

- Cost management

This includes process/ organisational efficiency studies, process redesign, and measures to improve cost-effectiveness.

- Development of strategy

This includes the use of costing to support business strategy, for example: in applying business process reengineering, in outsourcing services, and in making major changes to the product/ market portfolio.

- External financial reporting

This is usually for statutory purposes or inter-institution comparisons, and involves standardised approaches to many allocation choices.

- Costing for influencing external bodies

In another form of external reporting, universities, like other publicly funded or regulated organisations, may be required to disclose internal costing methods, for example to demonstrate non-cross-subsidisation.

- Influencing behaviour

Cost allocation is a powerful tool to influence behaviour, and it could be argued on the basis of Japanese experience that this is the most important purpose of all.

5.2.1 The findings from the empirical data

The survey indicated that the dominant view of the purpose of cost allocation in a university was to support operational decision making, by determining school costs (and surpluses) by means of allocation from central services. Of those that had experimented with ABC, the majority had done so with this same purpose in mind, albeit with a greater level of sophistication. Only a minority had considered the application of ABC to product decision making, and there was no clear statement of the potential use in cost management or strategic decision making.

The interviews confirmed the survey findings. The dominant purpose of allocation was to establish school costs in aggregate, with no particular interest in the use of allocations to support budgets or cost management in central services or schools.

There was no evidence that ABC was considered in terms of a role in external financial reporting or as a deliberate means to influence external bodies (ie. funding bodies).

In terms of influencing behaviour, ABC did not show itself as having been utilised for this purpose. There was evidence from the survey and interviews that premises cost allocation was being used partly for behavioural purposes, not least because of pressures on capital funding, with methods being chosen to encourage schools to economise on their usage of premises. Beyond these aspects, the only behaviour change apparently expected was simply as a result of giving schools a firmer baseline against which to control costs or to achieve surpluses, with behavioural incentives generally restricted to virement of expenditure.

5.2.2 Analysis

(a) Decision making (products)

The stimulus for the original development of ABC was the determination of more relevant product costs, and in the university context, the literature does indeed give some positive signals on the use of ABC in the costing of courses, research contracts and other 'products', in particular for pricing policy and product mix decisions, but also in terms of information for product design. However, much of this advice has been normative, and when one considers reported practice, the value of ABC for these purposes is less clear. For example, Jones (1986) developed a course costing approach to remove distortions in product decision making between full-time and part-time courses, although this was achieved without a full ABC exercise. At Leeds Metropolitan University (Burnett *et al.* 1994), non-ABC methods also seem to have worked well enough for course costing (although the information was then not sufficient for purposes like controlling overheads).

The empirical work in this current research in fact made clear that product-level decision making was (generally) neither the motivation for ABC exercises nor a particular usage of the data generated. One could suggest that this was a weakness in the approach taken by universities, but there were it seemed good reasons to support this approach. Firstly many product costs are dominated by the costs of direct academic labour and premises, so that any (expensive)

sophistication in allocation of other costs has low impact on overall product costs. The cost/benefit trade-off would therefore suggest more merit in concentrating analysis on labour and premises costs. Secondly some product income is ill-defined and variable, therefore in addressing viability of a product, the perceived benefit from cost reduction analysis (*direct labour and premises aside*) may appear inconsequential in comparison with the income uncertainties. The conclusion therefore is that ABC may be unnecessarily sophisticated for the purpose of costing of certain products, where there are high direct academic labour and premises costs, in particular where income is ill-defined or uncertain.

That there are products with lower direct academic labour is illustrated by Rumble (1997), who pointed out the very different cost structures associated with distance-learning, with examples from the (UK) Open University and other institutions. In particular, he noted the lower variable cost per student, the higher level of central overheads, the higher costs of initial development/ purchase of learning materials, and the reduced student-related workload for academic staff. He strongly advocated the use of ABC in this context.

(b) Decision making (operational)

Underlying the normative advice on university costing methods is an allocation of costs from central services to schools, so as to determine the overall cost of schools (and thus of their products). The main purposes of obtaining the cost information are to support budgeting/ control processes, in particular setting school targets for surplus of income over expenditure, and to identify cross-subsidies, so as to direct attention to 'problem' areas for cost reduction.

The empirical work confirmed that this indeed was (generally) the primary purpose behind the introduction of ABC, and that although normative advice is often based on the assumption that course costing is also a key issue, in the practical situation the overriding issue is indeed school-level finances within the institution.

For this purpose, there are doubts about the appropriateness of ABC, from an empirical viewpoint (from the survey and interviews), but also from some indications in the literature. Turk (1992) for example pointed out that if the purpose of allocation is simply to assess school financial performance, then ABC sophistication is probably unnecessary. Similarly, at the University of Manchester (Scapens *et al.* 1994), ABC was seen as unnecessarily complex for the purpose of a rational allocation of income and expenditures to resource centres. As with product costing, the

influence of high direct labour and premises costs, and the variability of income, provide a similar supporting rationale for this position. Therefore the conclusion is that ABC may also be unnecessarily sophisticated for this operational level of decision making, at least while current cost and income structures continue.

(c) Cost management

While ABC started as a product costing approach, it was apparent from the outset that the generated data had a role in cost management. The advantage of using ABC information is that it addresses cost control by examining the root causes of cost, however this is only practicable if the cause-effect relationship is defined in sufficient detail for this purpose. The empirical results indicated that because university costs were dominated by direct labour and premises, central services cost allocations were examined only in broad terms, even when 'ABC' exercises had been conducted. Typical of this broad brush approach is to use FTE students as a base without any consideration of the relative workload or resource usage created by part-time students or postgraduates. If ABC is to be used for cost management therefore, it needs finer detail than if implemented just for school or product costing.

Turk (1992) commended ABC for course costing not least because it provides detailed information on activity costs, which then enable management action on these costs. An example given was the processing of student applications, in the context of different ratios of applications to admissions for different courses, with emphasis on the use of ABC information to manage admissions costs, for example to assess actions like changing or automating the work flow.

The conclusion is therefore that ABC does have a potential role in cost management, but that the level of detail in ABC exercises as practised is generally insufficient for this purpose. If ABC is to be used for cost management, then the ABC exercise evidently needs to be designed at the appropriate level of detail.

(d) Development of strategy

Johnson (1992) warned that in the global competitive markets of the 1990's, the key to competitiveness is a focus on customer needs, and on developing and improving processes to meet these needs, ie. this may be the real value of ABC, rather than simply optimising the current position. Shank and Govindarajan (1993) emphasised ABC's role within the wider framework of strategic cost

management, and Cokins *et al.* (1993) addressed the use of ABC to support 'Business Process Re-engineering' (BPR). There was no evidence from the survey and interviews that ABC was yet seen in this strategic role, however it could be argued that ABC does have some relevance to strategy development in universities:

1. There is a need to be aware that the teaching activities of a university are part of a *value chain* from potential student to graduate (and maybe beyond). The traditional UK university took (undergraduate) input as suitably qualified school leavers, and its output as its graduates, thus apparently embracing the whole value chain. However, increasingly, some universities have extended their scope 'upstream' by running pre-degree foundation courses, whereas some have chosen the opposite route by franchising first year studies to 'feeder' colleges with a lower cost base. Similarly, universities are increasingly seeing 'downstream' potential in postgraduate and post-experience provision, and in exploiting the alumni database. It would appear that an internal ABC analysis provides part of the information needed for these actions.
2. In terms of *strategic positioning*, a business can compete on the basis of cost leadership, and also on the basis of product differentiation. ABC can evidently support cost reduction efforts, but it also supports product differentiation, by providing cost information to analyse new approaches to product ranges, for example moving away from a conventional form of delivery.
3. One *strategic cost driver* is complexity, and ABC has a recognised role in assessing the effect of this driver. In universities there would appear to be opportunities for ABC in considering the complexity of strategic choices, eg. in moving degree programmes to a common modular structure.
4. It would seem appropriate in the university context to put particular emphasis on using ABC for *process reengineering*, given the similarity of most product offerings across the university sector, and the ease with which innovatory products can be copied. This contrasts with the greater difficulty in copying the less visible business processes and delivery methods.

In conclusion, ABC does appear to have relevance to the development of strategy, albeit that, as with other decision making, some aspects may be dominated by direct labour and premises costs, and thus provide a lesser role for ABC. There would not seem to be any obstacle to extending cost management to more strategic measures like outsourcing of services and business process reengineering. If a university projects a reduction in the proportion of expenditure committed to direct academic labour and premises (whether as a general policy change or through approaches like distance learning) then there would similarly not seem to be any obstacle to developing a more strategic role for ABC in decision making.

(e) External reporting (to meet statutory financial requirements)

Traditionally, standard allocation systems have been imposed on financial reporting to ensure auditability and cross-organisation comparisons, etc. For internal management accounting purposes, however, there should be freedom to utilise allocation methods that are in the best interests of the organisation, and the literature makes clear that ABC's approach to costs (eg. accepting approximations, and excluding surplus capacity) divorces it from the financial accounting approach. The empirical results, as expected, showed no role for ABC in statutory financial reporting.

(f) External reporting (to influence external bodies)

There are situations where *internal* allocations may be published externally for some purpose. The empirical results showed no current interest in this use of ABC, but Doyle (1991) did demonstrate the value of this approach in using ABC information to support a claim for better funding of part-time students. There would seem to be potentially a similar role for ABC in calculating overheads for research contracts, where these have to be itemised and justified in the bidding process, and where evidence is needed to counter concerns of cross-subsidisation. The organisation may therefore gain by selecting an allocation system other than that which is optimal for purely internal purposes. This raises a conflict. The ethos for ABC is management usefulness, however if ABC is used for purposes related to influencing external bodies (in the same way that Dilley *et al.* (1997) suggested its use to obtain reduced taxation in the US), then there is a tension between the two purposes. Rather than compromise the value of ABC for management purposes, it would appear necessary to operate separate ABC systems, one for external reporting (which presumably has to meet requirements of accuracy, standardisation and linkage to current reported costs), and one for management purposes (which can be approximate, ignore surplus capacity, etc.).

Therefore the conclusion is that ABC does have a role for this purpose, but that it may require a separate costing system explicitly for this.

(g) Influencing behaviour

Costing approaches can be based on an underlying philosophy of attaining 'truth' (and, for some, 'fairness' by implication), and ABC is often seen as supportive in this, for example in supplying 'true' costs for decisions on product design. However a quite different philosophy can be taken, where the

choice of cost allocations or charges is made for behavioural reasons. This philosophy is very much in the Japanese tradition but has also been recommended and used in the Western management accounting literature.

In assessing under what circumstances the organisational purposes are best accomplished by behaviourally-designed cost systems, Merchant and Shields (1993) indicated that while accurate costs (like ABC-derived costs) may be appropriate for the development of strategy, behavioural aspects become more important for the implementation of strategy. The absence of specific mention of a behavioural purpose for ABC, in this research, tends to support their view.

The conclusion is therefore that ABC is not especially appropriate for influencing behaviour in universities. The only incidental use of allocation systems for this purpose (but not specifically ABC) in the literature and empirical data was in premises charging, where allocations seemed to be a convenient starting point, in the absence of knowledge of the cost-behaviour relationship.

5.2.3 Summary

While the costing literature indicates a variety of purposes for cost allocation, the practical situation for most universities is simply to allocate central services costs to schools so as to establish a baseline cost for comparisons with revenues. In the survey and interviews, the following cost allocation approaches and purposes were observed (in each case some level of virement within the allocated costs can serve the purpose of discouraging waste):

- No allocation, so no purpose to be identified.
- Cost allocations to schools excluding staffing and premises
Purpose: clearer picture of school cost for comparisons and budget setting.
- Cost allocations to schools including staffing
Purpose: As above, and to encourage efficient use of staff, with also possibly some unit-cost calculations for full-cost activities.
- Cost allocations to schools including staffing and premises
Purpose: As above, and to encourage efficient use of premises.
- Cost allocations to schools using ABC
Purpose: as above, but with allocations 'truer' and (in the opinion of some) 'fairer'
- Cost allocations to schools and products using ABC
Purpose: as above, with more detailed costing to support product decision making.

In this classification of the 'purposes' of cost allocation, there appear to be two dimensions:

1. The practical situation in which the allocation information is to be used (eg. product decisions).
2. The philosophy behind the choice of allocation methods (eg. 'fairness')

In Figure 5.1, the two dimensions are represented as a matrix of 'cells'. By this means the intention is to identify 'purposes' more clearly, in determining the appropriate usage of ABC. This is of course not the only way in which the 'purposes' could be organised into a structure, but the advice of Miles and Huberman (1994) is that "the issue is not whether you are building a 'correct' matrix, but whether it is a helpful one that will give you reasonable answers to the questions you are asking".

In the situation studied here, 'uses' are not entirely mutually exclusive, for example some product decisions are of such significance that they qualify also as strategic decisions. Similarly for 'philosophies', 'true' costs may be sometimes selected for behavioural reasons. All the same, the categories in practice are reasonably distinct and definable, and the categorisation and the matrix display are considered a useful means of exploring the structure of 'purposes' more clearly.

It could reasonably be asked which 'cells' on this matrix are plausible combinations (marked as 'OK') in a university. Firstly, *external reporting* would almost certainly utilise methods established by regulation and standardisation, apart from the potential desire to use internal allocations to influence funding bodies. For the latter influencing role, the underlying philosophy has been treated as 'truth' (the underlying philosophy of ABC) although this will be potentially modified by externally imposed standards, and by internally-driven modifications to 'improve' the perceived position on costs. Secondly, for the *development of strategy* it could reasonably be assumed that the university's senior management would prefer 'true' figures, and that they would use these with full knowledge of the non-financial aspects of the university's goals.

The remaining middle rows present a less simple situation. These are decisions taken by *middle managers*, not necessarily aware of (or even perhaps concerned with) all of the organisation's overall goals. They will often take action according to the cost information presented to them. It could reasonably be argued that in many such situations the decision maker should be supplied with costs as accurate and as 'true' as possible.

Figure 5.1 The Purposes of Allocation: Philosophy and Use

USE FOR ALLOCATIONS	Can take account of non-financial inst. goals			
Development of Strategy		OK yes (unit costs)		
Cost Management		OK yes (ABC)	OK	OK
Product Decisions		OK yes (ABC)	OK yes (standard costing)	OK
Operational Decisions		OK yes (ABC)	OK YES	OK yes (premises charges)
External Reporting	OK YES (statutory)	OK yes (influence)		
	Regulation and Standardisa tion	Truth <i>(the ABC philosophy)</i>	Fairness, Compromise, Equity	Behaviour, influenced towards Inst. Goals
PHILOSOPHY GUIDING CHOICE OF METHODS				

Key: OK: This cell is a plausible combination of philosophy and use

YES/ yes : Currently (or potentially) in wide/ limited use by UK universities

Shaded area: Implementation of Strategy

However, decisions made entirely on the basis of 'true' costs would not reflect the non-financial objectives of the university. For example, the university may wish to provide certain services to its local community, as part of a broad regional strategy, even if the services have to be delivered at charges that are below cost. If decision makers at school level focus primarily on financial figures, then such initiatives would be vetoed. The university can resolve (or at least ameliorate) this difficulty by providing the school with cost information that is not 'true', but is deliberately distorted, for example by setting charges below the real cost for library usage, premises usage and central services. On the matrix, the last two columns can achieve this through allocations based on fairness and/or behavioural impact.

Returning to the overall matrix, the following 'OK' cells appear to be currently or potentially in use by universities (marked YES for a majority, or yes for a minority). For external reporting, external audit requires use of regulated/ standardised methods, and no doubt there has also been some consideration of 'external' views in setting cost allocations, not least from the pressures now to improve the treatment of overheads in research contracts. For operational decisions, current allocation methods are largely based on Fairness etc., but with some aspects aimed at Truth (eg. using ABC to enhance the accuracy of allocations to schools), and Behaviour (eg. premises cost allocation to discourage waste). For product decisions, there is some limited use of ABC allocations, but otherwise it would seem that there is reliance on relatively unsophisticated standard costing. For cost management, there was no particular evidence of the use of allocation information, although some ABC users had indicated the development of a more questioning attitude towards central services costs. For strategic decision making, there was no particular evidence of the use of allocation information, although some simple unit-cost measures (eg. library expenditure per FTE) are of course available at this level.

In considering the relevance of ABC in this framework, ie. in the Truth column of the matrix, for each potential use of allocations, the role for ABC would appear to be as illustrated in figure 5.2 (DAL&P refers to Direct academic labour and premises):

Figure 5.2 The Potential Role of ABC

	Now (High dependence on DAL&P)	Possible future (Reduced role of DAL&P)
Development of strategy	Extension of cost management to strategic issues like outsourcing	Value chain analysis, Analysis of strat. drivers, Strat. positioning, BPR
Cost Management	Yes, but needs a finer level of detail than for product/ school costing	Yes. A 'traditional' use of ABC
Product Decisions	No, apart from allocation of DAL&P, or products with low level of DAL&P	Yes. A 'traditional' use of ABC
Operational decisions	No, apart from premises allocation	Yes, assuming that income variability does not compromise its value
External Reporting	No, other than <i>special (separate) cost analyses for external dissemination rather than for management use</i>	

The current high levels of DAL&P restrict the overall value of ABC (or indeed any) analysis of other costs, but there are indications of a possible transition to a reduced influence of DAL&P in the future. Continuing funding pressures may raise the ratio of students to staff in conventional teaching, but there are also examples of structural change in teaching methods, including the growth of distance learning, with its radically lower level of such costs (eg. Clare 1996), and the interest in using students to provide 'supplemental instruction' to more-junior students (Makins 1991). In this possible future, with a barrier thus removed (or at least reduced), it could be expected that ABC would become more useful, in step with the increased proportion of indirect costs.

Finally, in the review of the literature on 'loss of relevance' there was a clear message that different cost systems are necessary for financial reporting and for managerial decision support. Whatever the role of ABC in these cost systems, it is similarly clear that different ABC systems are appropriate for the different management purposes, with different levels of detail and consequently different choices of drivers and cost objects.

5.3 Theme 3: The Costs to include in the Analysis

In this section, there is consideration of the types of cost that may or may not be included in the ABC analysis. Arguments are presented as to which of these are particular issues in HE, and what this means in terms of the practicalities and effectiveness of the ABC exercise.

The following are the issues that arose in the literature:

- Joint costs and fixed costs

ABC does not deal satisfactorily with joint costs, yet in universities the two largest cost items, academic staff and premises, involve jointness. ABC methods implicitly treat all costs as variable and proportional, yet there are issues of fixed cost and non-linearity in long-term cost functions.

- Time-related cost issues

For an effective treatment of long-term cost behaviour, projected costs should be used rather than current or historical costs, and in particular current surplus capacity has to be ignored. Finally, the appropriate allocation over several periods of a capital expenditure (whether or not recognised as such in the financial accounts) is also a necessary adjunct to ABC.

- Restricted view of product cost

For some purposes it may be necessary to extend the view of full product cost for example to upstream/ downstream activities.

5.3.1 The findings from the empirical data

The shared use of premises did not emerge as a joint-cost issue in the survey or interviews. This would appear to follow partly from the fact that most allocations were to schools, so that intra-school jointness was not an issue for the cost system. A second factor would appear to be that in moving from a position of no allocations of cost, a major step was being taken by performing any allocations at all; for example Manchester was achieving good results simply by allocating cost for those premises directly assigned to particular schools. It is reasonable to expect that it would only be when such systems are refined (or the costs are to be allocated within schools) that the jointness issue will be addressed. One of the survey respondents did quote 'room bookings' as a driver, presumably finding this an acceptable way to separate out joint use. In fact, in considering charges for premises, the key concerns of the interviewees were of what amounts to charge, in particular for differing age and quality of premises. It would seem that jointness of cost was not yet a key concern.

Similarly, the jointness of academic staff time was not raised as a major issue in the survey. Presumably this was mainly because most academic staff are wholly contained within particular schools, so from the 'black-box' viewpoint there was not an issue. Where analysis went below school level, there was still little indication of major concern, so it might be presumed that activities are thought to be reasonably separable. However one ABC respondent did point out the difficulty of dealing with 'extra' time put in by academic staff on research, and two of the non-ABC respondents mentioned the concern over the difficulty in allocating academic staff time. Another plausible explanation for the lack of major concern is, as with premises, that these are secondary issues to the major first step of performing any costing of academic staff at all, and that these issues will perhaps only come to the fore when basic costing methods are more commonplace.

Other potential issues of joint cost did not arise in the survey or interviews. Respondents did not indicate any interest in costing customers, so the issues of jointness between customer and product in particular did not arise.

In the survey and interviews, the majority of ABC respondents confirmed the existence of fixed or core costs without identifiable drivers. Central management was the primary example, but also included were other central costs, eg. Finance, Personnel, Management Information Services, Corporate Marketing, and even a museum. No concerns were expressed about fixed/ core costs within schools (eg. no mention of school management/ administration) or within the main academic support services represented by the library and academic computing.

In the survey responses, there was no indication of a concern that ABC relies on an average cost approach, but this is not perhaps surprising given that the majority simply desired a 'fair' allocation to schools. There was similarly no apparent anxiety about allocating fixed costs using non-ABC methods, or about possible non-linearity or non-proportionality of cost behaviour.

The statistical analysis showed that for the 'new' universities (but not the old) a small fixed element did exist in the cost relationship for library expenditure. No-one in the survey had mentioned library costs as fixed (or partly fixed), although the views of the interviewees were that library expenditures were relatively stable, and potentially linked to factors other than demands on resources, which might leave open the possibility of a element that is fixed, relative to driver volumes.

Given that the aims of most survey respondents were to allocate 'fairly' the current or budgeted

central operating costs, time-related issues did not surface, although one ABC-respondent did indicate depreciation of capital items as a problem. While there was no explicit stated concern about the relevance of depreciation in terms of its part in the allocation of premises costs, there was evidently some ongoing discussion (seen in survey and interview comments) about the standardisation of premises charges to reflect their value to the user (eg. by use of market rates, or by adjustment according to age and quality). Charges made on this basis, rather than on the basis of historically-derived book values could of course circumvent the depreciation problem. They offer the potential also to exclude surplus capacity, and to apply charges that may be closer to current rather than historical valuations.

5.3.2 Analysis

(a) Joint costs

Joint costs can occur where a cost is incurred that benefits more than one recipient, perhaps the result of policy to achieve 'economies of scope', for example in the activity-product relationship. A related problem occurs in ABC (Innes and Mitchell 1990) where the cost (or resource consumption) is a non-separable function of several driver variables, demonstrated by jointness in the cost-activity relationship. Yet another problem would seem to apply where there is jointness between products and customers, eg. an advertising campaign to promote short courses to a particular set of industrial customers.

The allocation of a joint cost is to some extent arbitrary. While there may be reluctance to allocate joint costs within the ABC exercise because of this arbitrariness, there would then be real product-driven costs unaccounted for, and perhaps worse, inconsistent total allocations (eg. a product lucky enough to incur a joint cost getting a 'free ride'). So there is little choice but to allocate.

Joint costs can arise in a university, and most important are those involving the major cost items of academic staff and premises, especially if analysis is below school level. If costing methods (of any type) become more commonplace, with greater attention to cost issues below school-level (ie. beyond the situation seen in the empirical data), then these issues of jointness will need to be addressed, even if they are not the highest priority at present.

It is not particularly easy to separate out the activities of academic staff, but it has been done by special exercises. The core problem appears to be as in this example:

A member of staff has 8 'contact' hours per week with students (2 lectures and 6 seminars), and also undertakes administrative duties and research. The questions are:

- a) What proportion of the salary should be allocated to each of teaching, administration and research?
- b) Of the amount allocated to teaching, how much should be allocated to each of the contact hours, given different levels of preparation and assessment?

New universities often express the academic staff contract in terms of total contact hours, and then apply specific remissions for administration and research. This does not help with question (b), but ostensibly gives a solution to problem (a). From the lecturer's viewpoint, he/she may well be more enthusiastic about some aspect (eg. research) and commit a greater proportion of time to it than required, but from the university viewpoint it could be argued that if the remissions are considered fair, and appropriate for the workload desired, then it is immaterial what the staff member does, perhaps in his/her own time, provided all goals are met. Of course, if the remissions are not commensurate with expected workload then there is a problem. For example this would arise where pressure is put on staff (eg. in terms of promotion prospects) to conduct research (or undertake course development) but without giving remission from teaching load; in this situation it could be argued that part of the staff salary should be allocated to the activity even if no explicit remissions are involved for the staff member, since the time spent has a real value, and has alternative uses.

As for premises, when a single building contains a mix of types of use, there is another jointness issue. For example a large university building could contain a mix of: administration departments, student accommodation, large lecture theatres, small seminar rooms, high-technology laboratories, and library facilities. Some method has to be found to allocate joint costs (eg. security systems) between these; published guidelines give some help in this, usually using some weighted version of floor space. Once partitioned into the separate facilities, some of these can be clearly assigned to specific schools or departments, whereas some have shared use. Most important of these are teaching facilities shared by several schools. If central booking systems exist for shared premises, then the data may be available to support allocation according to bookings, otherwise special studies or surveys have to be conducted.

The survey showed great interest in allocations to schools, and a minor interest in allocations to product, but no particular interest in allocating to customers. However this could eventually change, for example as marketing and agency costs increase for particular overseas markets. Customers and markets are considered as cost-objects later (in 'selection of cost objects', 5.4.2(b)), but it is useful to

give some consideration as to how this could be handled, where these costs are joint between product and customer. To avoid an imbalance of treatment of product cost, all costs do need to be associated with product, albeit that there may be a valid analysis also possible for customers. In this sense one would not just speak of the cost of a student on course A, but of the cost of a student on course A from market category B. Most costs do relate to the product rather than the market category, so this seems a reasonable way to deal with these costs, yet without losing their specificity as regards market. What it does imply is that it may be necessary to accept that there is not a single (and simple) course cost.

In conclusion, for premises it would appear that as part of an ABC exercise, the joint cost issue can (and should) be resolved by current recommended practice, but noting that there are issues of surplus capacity and asset valuation to be discussed later in this section. For direct academic labour, for any purpose other than allocation at school level (where the problem does not arise), the jointness issue can similarly be resolved by current recommended practice. As universities increase their interest in costing markets and customers, the jointness of product and customer will require an allocation of some costs to the product/ customer combination.

(b) Fixed, marginal and average cost

Kaplan and Atkinson (1989) emphasised that a key benefit of the ABC approach is that it forces organisations to drop their notion that costs are fixed, and to explore the causes of the existence (and often growth) of these areas of cost. In the university context, there is perhaps a lack of recognition of the variable nature of 'fixed' costs, although Carr (1994) did for example demonstrate that ABC can provide a means of assessing the impact on these 'fixed' costs of proposed changes in application or enrolment procedures.

However, not all 'fixed' costs can necessarily be converted to variable, simply by extending the time-frame. A valid criticism of ABC, as applied, has been the disregard for the possible existence of truly fixed long-term costs (Dugdale 1990b). In fact, even where a cost relationship has no obvious fixed cost, a non-linear relationship in which cost rises quickly and then more slowly (economies of scale) will approximate to a linear 'fixed + variable' relationship over a particular range of driver variable values. Thus even in a wholly variable, but non-linear, relationship, there is in effect an implied fixed cost. Therefore both of these are possibilities:

- Costs perceived as fixed, but actually variable (or partly so) in the longer term,
- Costs perceived as variable in the longer term, but actually containing a fixed cost, in some cases

implied because of non-linearity.

The survey and interviews established the view of finance officers that some costs are fixed. It could reasonably be argued that such costs do have some variable element in the longer term, but that the finance officer view may be conditioned by a short-term perspective. For example central management is seen universally as a fixed cost, yet one could argue that if a university doubled in size it is likely that additional positions would be created (and necessary) to cope with the implications of size. Similarly the cost of a museum appears to be unrelated to driver volumes, yet in the same growth scenario, it is not unreasonable to suppose that a more liberal attitude might be taken towards the museum expenditures. Having said all this, it is clearly not the case that expenditures are wholly proportional to driver volumes, as this would be apparent even in the short-term, thus the conclusion is that there are generally both (long-term) fixed and variable cost elements in what are perceived as fixed costs.

Although the survey did not suggest the existence of fixed cost in the library service, the interviews left open the possible existence of fixed cost, which was confirmed for the new universities by the statistical analysis. However, it is not easy to determine externally whether economies of scale exist without relating to the service provided, as the economies may be utilised to improve service provision. Major improvements of service would of course be clearly visible (to finance officers), so the conclusion is that for support services like the library, there probably is a fixed element, but representing a relatively small proportion of total cost.

It might perhaps be possible to establish the existence of economies of scale through the ABC interviewing process. The problem with this is that it is difficult for a manager to answer a question like "if FTE's were 10% larger, how much higher would you expect library expenditure to be?". The respondent may in the end reply according to normative views, supposition, or even defensiveness, and in the absence of objective information, probably little would be established from this.

While the presence of fixed costs did not seem to cause anxiety in terms of allocations, this reflected the limited purposes of allocating to schools. If the allocated costs are to be used for decision purposes, for example product decisions and cost management, then it is necessary to address the issue of 'relevance' of the fixed costs. Taking a decision-relevant stance towards what are clearly identified as long-term fixed costs, these costs should be excluded from the decision analysis.

One area of fixed cost not explicitly mentioned in the survey responses (but mentioned by one

interviewee) was the servicing of debt. While many universities may operate more or less neutrally in terms of cash balances and debt, some have incurred significant debt for capital projects, and now have to service that debt. For decision purposes (eg. calculating product cost for product mix decisions) this cost is only relevant if it is associated with an increase in activities and drivers. If it is an intrinsic cost of providing additional facilities to support more students, and indicates the scale of further expenditure to support yet more students then it would seem valid to treat as variable. However, in an ABC exercise it would presumably require establishing in what way the funds were used originally, to define the driver relationship. If the funds were spent (or partly spent) on projects which have no clear driver link to current or future students (for example a capital project that failed to produce benefit) then the interest repayments would reasonably be considered as a fixed cost.

The same arguments apply to interest received on cash balances and investments. Where the interest has a direct connection to drivers (eg. interest earned on fees paid in advance) then there is a valid offsetting revenue, whereas interest paid for example on the profits from a 'Business Expansion Scheme' would be the counterpart of fixed cost and would not be relevant for decision purposes.

A final area of fixed cost is that of isolated expenditures not representative of normal current (or foreseeable future) costs. In this category are included for example the costs of merging or de-merging institutions, or the costs of a large-scale set of retirements and redundancies. For product cost calculations these costs would not be relevant unless similar exercises were expected in the future; in this case it would presumably be reasonable (but complex) to apportion these costs over the expected interval between exercises, and link the annual cost to the driver whose growth is likely to trigger these exercises.

The viewpoint on dealing with fixed cost is related to the view on whether to use marginal or average unit costs, and this in turn depends on the purpose of the costing exercise. Academic advice to accountants and organisations on decision making has often been to utilise marginal or incremental costing (or use only 'relevant' costs, ie. those affected by the decision). Yet it is still common practice to use fully absorbed costs for decisions, and in fact as commonly applied, Activity-based costing is such an approach. For some purposes in universities, there appears to be some reasonable consensus on the use of average cost; examples quoted in the literature include:

- Comparisons within and between institutions
- Support for more equitable funding for part-time students

However, for decision purposes (eg. for resource re-assignment to schools, cost management, product design and product mix decisions), where the consequences are long-term, there is theoretical support for a decision-relevant approach, using long-term marginal (or incremental) cost for decision making. In practice if most costs are variable in the long-term, then ABC average cost is justifiable as a reasonable approximation to long-term marginal cost.

However, even so, a better decision-relevant approach is to remove any identifiable long-term fixed cost elements before conducting the ABC exercise. The danger of this is that some large costs which are perceived as 'fixed' may not be wholly fixed in the long-term. Bearing in mind that such fixed elements within perceived 'variable' costs are probably small, and that there is a danger (as seen in the survey) of wrongly interpreting short-term fixed cost as fixed in the long-term, the safer approach would be to err on the side of average cost and only accept the existence of long-term fixed cost where there is clear evidence.

To illustrate the point, Turk (1992) recommended the use of ABC (average-cost) information to support cost management exercises. While it could be argued that a long-term marginal cost approach might be more appropriate, it would make little difference in the main example quoted (the admissions function), which is largely a staff cost linked proportionately to activity levels. However, a marginal cost analysis with too short-term a perspective (eg. treating staff costs as fixed) would invalidate the exercise.

The overall conclusion therefore is that long-term fixed costs are probably a relatively small proportion of some university costs (eg. libraries), and that for most decision purposes, the use of ABC average costs as a proxy for long-run marginal cost is a reasonable approach. However, where there are identifiable long-term fixed cost elements not linked to any driver (and in particular wholly independent of the size of university), then these costs should be handled separately according to the purpose of the exercise. If the purpose is intrinsically about 'fairness' or similar philosophies, for example in deciding allocations of resources to schools or producing 'average' costs for external comparisons, then any method of allocation is sufficient if considered equitable. This would not then be an ABC exercise, although some of the non-fixed costs may be allocated using ABC methods. However, if the purpose is long-term decision making or cost management, then these fixed costs are not relevant, so where there is clear evidence of particular fixed costs, these should be removed from the ABC analysis, and separately investigated for cost management purposes. For product pricing decisions, if price has to include some provision for long-term fixed costs, then the basis for this provision should be understood as being unconnected with the product cost.

(c) Currency of information

Most cost allocations utilise either historical costs (eg. the previous year), current costs (eg. the previous month), or budgeted costs (eg. the next year). Johnson and Kaplan (1987) pointed out that it would be more appropriate to use forecasted future costs, given that in general the information is used for decisions that relate to future conditions. This would be particularly true with decision making involving long-term commitment, typical of many product decisions in a university. Extending the argument, Shank and Govindarajan (1993) also pointed out that ABC information is a consequence of current strategy (eg. breadth of product range) so caution is needed if this strategy itself is subject to change.

The survey showed that the typical purpose of an ABC exercise was the equitable allocation to schools of current or budgeted costs. In this sense, the issue of outdated information does not arise. However, if other purposes are considered, then the issue is real. It was apparent from the interviews that for premises the historical book value and its current depreciation component were problematic, and this is discussed below, under 'Capital employed'.

Premises aside, however, there was no evident concern about outdated information, perhaps largely because of the dominance of academic labour and premises costs. The current cost of academic labour may not totally reflect future costs (for example in considering the long-run effect of adding a new course) because of changes in productivity, salary inflation, or indeed the labour proportion of total cost. However, such changes are apparently perceived to be relatively small.

In considering long-run product costs, then of course it would be appropriate to use projected rather than current costs. These projections would need to encompass not just differential inflation rates, but also structural changes. For example, key aspects would be the extent to which tutor-led learning is replaced by student-centred resource-based learning. While projections like this are difficult, one could argue (borrowing from Cooper and Kaplan's (1988) comments about ABC) that it is better to be approximately correct rather than precisely wrong.

A pragmatic view, in the current context, is thus that the use of current/budgeted costs is not particularly problematic (apart from premises and other 'capital' aspects) but that if there is knowledge of significant future change in cost structures, then these should be incorporated in the analysis.

(d) Exclusion of surplus capacity

Kaplan (1988) stated that the product cost system should ignore the cost of surplus capacity, in that as a temporary phenomenon this is not truly related to long-term product cost, so, for example, the allocation of the cost of a service department should be on the basis not of number of transactions processed but on the number of transactions that *can* be processed, ie. the capacity. In applying ABC to a university, it therefore has to be asked whether there is unused capacity in premises, academic staffing or other areas of cost.

Comments from the survey and interviews indicated that for most universities currently there is not a surplus of rooms at peak times (in fact probably the opposite). However, this possibility does have to be considered; indeed one of the interviewee institutions had recently moved from a deficit to a surplus of premises. Bottomley (1972) showed that unused capacity can also exist in non-utilisation at off-peak times and in use of rooms below their capacity. For example a lecture theatre with a capacity of 100 is clearly not being used to capacity if being used for a seminar group of 20 students, or if standing empty in the evening.

There needs to be a distinction drawn between capacity which is truly surplus and unused, and that which is necessary to cover normal fluctuations and risks, eg. where the provision of lecture-theatre capacity has to cover variations in student numbers. It would be impracticable to think that 100% occupancy is a benchmark for allocation of costs, and some lower level might be more sensible (eg. 'normally achievable utilisation').

Similarly even if a lecture theatre is 100% occupied in term-time weekdays, is it still correct to say that it is running below capacity, because of the lack of use in evenings, at night-time, weekends and vacations? If a lecture theatre is necessary to support weekday needs, and has no practicable use at night or at weekends, then it would be wrong to use the justification of unused capacity (at these times) to support allocation of only part of the costs to the weekday usage. This adds further emphasis on defining the base as 'normally achievable utilisation' rather than risking the use of some capacity measure that is actually unachievable. This is not to say that the institution should not endeavour to make use of the available weekend capacity, but that allocations should be based on what is considered likely to be achievable.

There was no indication from the survey or interviews of any other endemic situation of surplus

capacity, whether in academic staffing or elsewhere. All the same, an ABC exercise would expect to identify such situations, and exclude the surplus capacity from for example calculations of product cost.

As a final consideration, it is interesting to speculate on how to handle the opposite situation, that is a temporary over-use of capacity. If surplus capacity means under-recovery of cost (in product costing) then presumably over-used capacity should imply over-recovery of cost. Consider for example a department whose capacity for some task is 100 units, with a budgeted cost of 1000, and whose allocated cost is 10 per unit. The argument for surplus capacity is that if purely temporarily the output is 50 units, then the allocation should still be at 10 per unit. It would seem wholly reasonable that in the opposite temporary situation where output is 150, the allocation should still be 10 per unit. The conclusion therefore is that for product costing, the most reasonable basis for the allocated cost per unit is given by the total cost of operating at normal working capacity/ utilisation (allowing for the long-run average incidental costs of the variation, eg. overtime premiums), divided by total units produced at this level. *For example in a university this would mean determining an allocation per unit for premises, registry, academic staff, etc. on the basis of normal working capacity, and using this in the cost analysis regardless of temporary surplus or shortage of capacity.*

(e) Capital employed

A problem in costing is how to 'allocate' an expenditure made in one period to a number of periods where the benefit is received. Expenditure could be on a 'wasting' asset (eg. computers and vehicles) with a relatively short lifetime, and where the value of the asset at disposal is clearly lower (or nil). For this allocation there are several depreciation methods available. However, there is weakness in depreciation methods that ignore inflation and loan interest (or loss of investment interest); this weakness compromises the validity of allocated capital costs based on conventional depreciation methods.

A second type of expenditure is on buildings and land, in which case the lifetime can be much longer (decades or even centuries for some universities) and the value of the asset may not diminish, and may even appreciate. The weaknesses of depreciation methods are accentuated for these assets, and this is a particular problem for universities given the substantial investment in premises for teaching, administration, and student accommodation.

If the costing issue is approached from an ABC (or 'truth') philosophy, then the methods used should

not be constrained to financial accounting conventions. In particular this means freedom to deal with all types of expenditure with multi-period benefit, whether or not capitalised in the financial accounts (eg. course and curriculum development, training of staff, development of computer software).

A related but reverse situation, is how to deal with capital surpluses. For example, revenues for a course received in advance of the incurrence of costs are in effect a 'negative' capital expenditure in terms of working capital. The university benefits by investment income or bank interest, or at least reduces its overall interest payments on borrowings.

In conclusion, if the multi-period allocation problem is approached with a philosophy consistent with ABC, then it would seem reasonable to take this approach:

- 'Capitalise' all expenditures that have multi-period benefit, whether or not capitalised in the financial accounts
- For wasting assets, include provision for the cost of capital and for the inflation in replacement cost (eg. convert the capital sum into an equivalent inflation-linked 'rental')
- Buildings and land should at least utilise current valuations, and some usage charge based on the valuation. Alternatively (see theme 6) some form of opportunity costing could be considered.
- Where temporary capital surpluses arise, giving a financial benefit, this benefit should be allocated to the causal activity in the same way that a cost of working capital would be allocated.

(f) Restricted view of product cost

Shank and Govindarajan (1993) pointed out that cost of a product should include all costs, in particular those upstream (eg. product development) and downstream (eg. customer service), and that this is often missed in ABC. In a university this would seem a valid point in that for example course costing as recommended in various guidance notes almost never includes the cost of course design and development; these of course should be dealt with as 'capital' expenditures as discussed previously. The costs of careers and placement services can be dealt with satisfactorily by properly relating to the appropriate driver, eg. graduating students rather than simply total number of students.

In considering the 'full' cost of educating a student, then a particular, and major, cost is that of student accommodation, if its cost cannot be covered by student rental charges, ie. the university has to subsidise accommodation places. In this case, the total cost of educating a student comprises not just the teaching and administration costs but also, for students requiring accommodation, the value

of the subsidy. The same argument applies for any other area of subsidy, for example catering services.

In commercial environments, the overall profitability of a customer also relates to sales of incidental products/ services (for example, a hotel guest's expenditure on meals). It seems reasonable to take this view of a university student, so there should be perhaps consideration of the offsetting of costs by incremental profits from for example: library fines, and sales of books and merchandise.

However, in practice, these profits are not large, and probably apply similarly to all classes of student, so it may be of limited value to add these aspects into the ABC exercise. All the same, the principle is important, and potentially the sums of money could become significant. For example, if an undergraduate course becomes a source of supply for profitable postgraduate courses, then it might seem reasonable to allocate from the postgraduate course a sum comparable to that which would otherwise need to be spent on marketing or agency commissions to obtain these students.

Overall, then, a reasonable approach for costing of students would appear to be to include in the costings any major subsidies (in particular for accommodation and catering), identified to the types of student who benefit, but to consider other incidental costs/ revenues only if sums of money are significant, in particular if they do not apply uniformly to all students.

For other university 'products' the position is less clear. For example, it is often argued that an initial project (eg. funded research contract) where costs exceed revenues, may have a 'payoff' in terms of staff development, consultancy activities, or other (profitable) contracts. Evidently these situations have to be dealt with on a case by case basis, related to the likelihood with which these benefits will accrue.

5.3.3 Summary

ABC is a sophisticated approach to cost allocation, and by following cause-effect relationships offers 'best practice' in determining 'true' costs. However, there are many aspects of cost that cannot be dealt with by ABC, yet have to be incorporated into the cost calculation. There are many approaches possible, but the suggestion here is that if carried out as an adjunct to an ABC exercise, then the philosophy should follow as closely as possible to that of ABC. Taking this viewpoint, the following seems to represent good practice in dealing with these categories of cost within a university.

Cost category	Approach suggested
Joint costs - Premises	<i>Allocate by current recommended practice, eg. weighted floor space</i>
Joint costs - Academic labour	Allocate by current recommended practice, eg. time-sheet surveys
Jointness between product and customer	Allocate to the product/ customer combination
Fixed costs - decision making	Ignore minor fixed elements in otherwise variable costs. Exclude costs where clearly fixed in the long-term, and where certain that there is no link to any activity levels or driver volumes (in particular no link to the overall size of the university)
Currency of cost information	Use projected costs if these (or their structures) are significantly different, but otherwise use current/ budgeted costs.
Surplus capacity	Exclude surplus capacity in excess of what is needed to cover normal fluctuations and risks. Allocate premises according to a capacity defined as 'normally achievable' in terms of occupancy and usage. Allocate services according to normal working capacity, and ignore temporary under or over use of resources.
Capital employed	Capitalise all expenditures with multi-period benefit. 'Allocation' should include provision for cost of capital and inflation. Buildings and land charges should relate to current valuation (but consider opportunity cost).
Interest paid or received	Allocate if linked to a driver, otherwise treat as fixed.
Full product cost	Include (by category of students) any subsidies for accommodation, catering, etc. and significant incidental costs/ revenues.

5.4 Theme 4: Carrying out the ABC exercise

In the previous section, issues were examined that related to the choice of which costs should be allocated. In this section, issues are considered that relate to the choice of how these allocations are implemented. The literature review raised issues in the selection of cost drivers, and also related to the choice of the cost objects to which allocations are to be made.

5.4.1 The findings from the empirical data

In terms of the selection of drivers, the survey of ABC users indicated a spectrum in terms of the number and sophistication of drivers. All institutions appeared to start with the (non-ABC) set of FTE students, FTE academic staff, and premises space, and supplement this with a range of drivers, for example supplementing the FTE student driver with a student headcount driver.

It was clear from the survey remarks of both ABC users and non-ABC respondents that the time and cost of the exercise were of great concern, thus there was an incentive to avoid over-complexity in the selection of drivers. This was apparently reinforced by the concern over getting co-operation from staff, in that simplistic methods are easier to explain, and to some extent can be derived with minimal interviewing and discussion. The most frequently mentioned problem (two of the five high-sophistication users) was in fact agreeing the number and types of driver. Aside from the three basic drivers, the survey showed that income (in various forms) also appeared commonly as a driver, with comments indicating that it was, at least in some cases, truly being used as an activity-linked driver rather than just a convenient allocation base.

A common concern was how to allocate both academic staff and premises costs, discussed earlier as a joint-cost issue. In a sense, this is also a driver issue, in that it can be expressed as a problem of determining driver variables that represent the link with usage, for example 'class contact hours' for academic staff costs, and 'weighted floor space' for premises. Because of these difficulties with what are the major operating costs, the survey and interview comments indicated that there was less incentive to fine-tune the lesser costs, given that the purpose was generally to determine an approximate total cost for a school and/or a product.

The selection of cost objects was conditioned by the 'black box' view of the university, in that (with one exception) the survey ABC-users allocated central costs to schools rather than directly to

products. About half of these institutions then allocated down from school level to product or product range. So the consensus view seems to be that schools are always a valid cost-object for receipt of allocations, and that (dependent on the purpose of the exercise) products or product ranges are also valid cost objects.

There was no mention of the use of customers or distribution channels as cost objects.

In terms of a manufacturing-style cost hierarchy of product/ batch/ product line/ facility, there was some indication from drivers chosen of a comparable hierarchy involving courses, cohorts, teaching v. research, etc., with the caveat that the dominant hierarchy appeared to be product (eg. course)/ product line (school)/ facility (central costs).

5.4.2 Analysis

(a) Selection of drivers

In carrying out any ABC exercise, a balance has to be found between the costs of the exercise and the benefits attained. The cost system designer is therefore ideally seeking a small set of easily measurable drivers, but which adequately approximate the cost/ activity/ driver relationships for the desired purpose of the exercise.

Cooper (1989a) advised that significant benefits can arise (in the context of product costing) even if the ABC exercise is constrained to use only a relatively small number of drivers, and by preferentially selecting drivers that are easier to measure, eg. number rather than value of transactions. In the latter example, if there is an excessive range of values for transactions, Cooper suggested separation into categories, each with a cost driver, although an alternative is the use of weightings so as to maintain a single (weighted) driver. The latter approach is of course how universities normally handle the demands of different categories of student (full-time, part-time), in using 'full-time equivalent' students as a single base for many allocations.

The optimal selection of drivers is fundamentally related to the purpose of the ABC exercise, yet there was little evidence that this relationship was explicitly addressed by survey respondents. Manchester did address the issue, and concluded that for its purposes of allocation to schools, ABC was unnecessarily complex. If the purpose of the exercise is to arrive at a school cost or a product cost that is accurate enough to support decisions on resource allocation or product mix, then it would

appear that Manchester's approach using three drivers (students, academic staff and premises) is probably adequate for these reasons:

- Academic staff represent the largest cost component, so it would seem justifiable to *commit effort* to the task of properly investigating the activities here and allocating as appropriate to teaching, research, etc. A typical single driver would be some measure of hours, weighted according to the type or intensity of the work.
- Premises represent the next largest cost component, so it would seem justifiable to commit effort to the problems of joint use of space, differing quality of space, and differing utilisation (eg. recognising peak times and dates). A typical single driver would be some measure of floor space and duration of use, weighted according to the type/ quality of the space, and to the timing of the usage (within the day/ week/ year).
- The remaining costs (library, registry, etc.) are each a relatively small component of total cost, so here a detailed activity analysis (for each unit and sub-unit) is probably not justifiable in terms of the improvement gained in accuracy of school or product cost. Where the purpose is definition of school or product cost, the only justifiable analysis would be one where the results of a limited exercise pay off in improving the *aggregate* accuracy of these costs across several functions in a university, or the accuracy of a particular type of cost across a number of institutions. This could arise for example where the costs of activities are distorted by over-simplistic allocations which have a common bias. *Part-time students are potentially such a category, where the use of weightings in the standard FTE calculation may not adequately reflect the costs incurred.* The pragmatic approach for these central services is therefore to limit the allocations to the use of one or perhaps two (possibly weighted) drivers, where, if cost effective, the weightings are based on some limited analysis of workloads.

In the discussion so far, the purpose has been considered to be that of school or product costing. A different situation applies however if the purpose is cost management, for example measures taken to reduce unit costs in service departments. If a service like registry is a relatively small component of total university costs, then a simplistic allocation (eg. per weighted student) may be sufficient for the purposes of school and product costing. However, it tells us nothing about the internal processes of the service, and thus gives no information on how to increase efficiency or reduce waste. For this the detail is needed. In the registry for example, it is necessary to separate out the activities associated with applications processing, from student enrolment and administration, as only by this means could action be taken to improve the efficiency of applications processing. Thus the need here is for a fully detailed ABC exercise, with a recognition of several/ many activities and several/ many drivers.

This is not to say that any cost management exercise necessitates a detailed ABC exercise across the university. While this would properly address cross-functional cost issues (eg. use by registry of computer services), an exercise focused on a single service would still be capable of producing useful information for cost management decisions (eg. streamlining the flow of paperwork, or simplifying procedures).

It is interesting to place this discussion in the context of the federal 'black box' view of the university. In this context it would presumably be acceptable to conduct isolated studies within individual departments, and one could imagine a 'rolling' programme of studies continuing through the university. The question is: what would be missing from the cost management analysis by using a piecemeal approach, and what should/ can be done to correct the omission?

As an example, suppose that for certain courses, the registry received very large quantities of inappropriate applications. Regardless of internal processing efficiencies, a complementary approach might be for the schools to be more specific about acceptance criteria, thus reducing the number of these inappropriate applications. With a comprehensive detailed ABC in the university, the school would be faced with a cost issue by an allocated cost based on the number of applications processed, and would be motivated to take steps to reduce it.

In the absence of such a detailed cost allocation to the school, the approach has to be for the registry to advise the school of its cost problem and request assistance in solving it. A cynic might say that the school would not feel motivated to co-operate as this action would not reduce its own costs. However, assuming some level of central encouragement, and some shared sense of purpose, it seems reasonable to anticipate some degree of co-operation. In fact, even in the case of a fully detailed ABC exercise, if a school is receiving a relatively small charge for the applications, then the charge has little or no motivational value anyway, so that co-operation would still be a requirement.

An alternative approach to cost management and product design, without incurring the cost of a comprehensive university-wide detailed analysis, is to focus on the attributes or features of the products, as suggested by Brimson (1998). In applying this concept for example to taught courses in a university, for each activity there would be an evaluation of the cost impact of each possible attribute (undergraduate v. postgraduate, subject of study, etc.). This has the advantage that it forces certain controllable product design issues to the fore, even if most activities are dominated by non-controllable drivers. Given the failure of current normative advice to deal with the cost

implications of product design, this seems a particularly appropriate influence for the design of university ABC exercises.

(b) Selection of cost objects

Cooper (1990a) suggested that the conventional separation (in product costing in manufacturing) of variable v. fixed cost be replaced by a hierarchy of unit of product/ batch/ product line/ facility, giving evidence that the introduction of even just one of these intermediate levels brings significant benefits, and it has been noted that a similar hierarchy can be applied to customers.

In a university, the following product cost hierarchy can be recognised:

- Product (eg. the cost of delivering a specific course to a student, or a specific research contract)
- Batch (eg. the costs associated with a lecture, or a cohort of students)
- Product-line (eg. the cost of designing and running a course as a whole)
- Product-line (eg. the cost of running a group of courses or a set of research programmes)
- Product-line (the cost of a school)
- Facility (central costs)

The customer hierarchy would seem to be sufficiently well represented by:

- Customer (eg. student, consultancy customer)
- Customer-type (eg. local student, international student)
- Facility (central costs, including eg. regional marketing and residential accommodation)

The 'traditional' ABC exercise in the literature ultimately allocated costs to products. However, to arrive at the product cost, allocations may go through several intermediate stages, thus involving intermediate cost objects (eg. departments or cost pools). Information designed for financial reporting is often too aggregated for decision purposes, and similarly, in a multi-stage ABC process, there is a possibility, through aggregation at each stage, of losing important detail in the cost relationships.

The dominant approach of the surveyed ABC users was to allocate to schools, although some then allocated on to products. There is a potential issue if the detail of the allocations to schools is not preserved in the allocations to products, however if the purpose of the exercise is the approximate determination of product cost, then it probably makes little difference to the accuracy of this cost whether central services are aggregated at school level before allocation to product, given the

dominance of academic staff and premises costs.

While most of the ABC emphasis has been to trace costs ultimately to products, the method can also be used to trace costs to customers, types of customer, and distribution channels. Only in recent years have universities embraced ideas of marketing and 'customers', so it is perhaps unsurprising that there was no mention in the survey and interviews of the costing of customers. However, marketing has now become established as a function of HE institutions, and expenditures of this nature seem more likely to increase than decrease in future. For taught courses (and research degrees), there is an interesting confusion over what is the customer. In one sense it is industry and society, but for most purposes it is the student. Therefore, when there is a calculation of the cost of a course as a product, and a differentiation for example between full-time and part-time, this is in a sense defining customer types also. Implicit in this product costing is a recognition of customer costing, in effect because for most purposes a customer (student) is regarded as purchasing one and only one product (course). The absence of mention of customer costing can reasonably be justified given that it is already partly accomplished via product costing. For taught courses, it is necessary therefore to ask whether there are areas beyond this implicit link, where customer costing is valid.

There is some possibility of 'repeat business', in that postgraduate students may be recruited from outgoing undergraduates. The scale of this is not large however, and approaches are possible that are simpler, compared with the complexity of dealing with a minority of multi-product customers (eg. estimating the postgraduate 'benefit' that can be attributed to an undergraduate programme, as mentioned earlier in 'restricted view of product cost', 5.3.2(f)).

One area of cost that is significant for many taught courses is the marketing cost (eg. exhibitions) targeted at specific sources of recruits, in particular international students, and the commissions (on fees) paid to specialised agencies. These truly are costs linked to the customer-type rather than the product. Financial differences in the cost of delivery of product to these customer-types are relatively small (eg. the provision of international student centres, and support for English language skills), but as in the earlier discussion on context, the revenue differences may be considerable. (Another example of customer-type as distinct from product-type is where local home-based students make lesser demands on (possibly subsidised) residential accommodation).

There remains a decision on how best to handle these market or customer-type costs. Where these costs are joint with product, it has already been noted in the discussion on joint costs (5.3.2(a)) that to incorporate into product cost requires sub-dividing product into customer types. A practical

approach to this would appear to be for costs to be directly allocated to customer types, and for these aggregated customer-type costs to be allocated to the product-customer-type combination. Where market costs are not joint with products (eg. promotional activities ahead of delivery of product), then the customer-type costs will be 'fixed' from the viewpoint of product costing.

Overall then, the cost objects conventionally used in School/ Product costing (departments, schools, cost pools, and product-types) would seem broadly satisfactory. For product design and cost management these would perhaps require some refinement, for example in the separation of costs associated with a class/ group of students, so that economies of scale can be investigated. Some customer-types are implicit in the definition of product-types (eg. full/ part time, under/ post graduate); where customer-types are distinct from product-type (eg. sources of students) then additional cost objects are necessary for the customer-types. This would appear to create a need for lower level cost objects to cover the product-customer-type combinations, but it may be more practical to handle this by a subsequent analysis rather than in the ABC analysis itself.

Aside from taught courses and research degrees, the university does have other customers. A research or consultancy contract for example has a customer. However this is not a mass product, and most costs can be directly associated with the product. If a university reaches the point where it 'cultivates' industrial customers, and thereby develops a relationship involving repeat business, then it would seem appropriate to ascribe certain of these costs to the customer. In general however, the product would seem to be a satisfactory cost object.

5.4.3 Summary

Appropriate ABC drivers would appear to be:

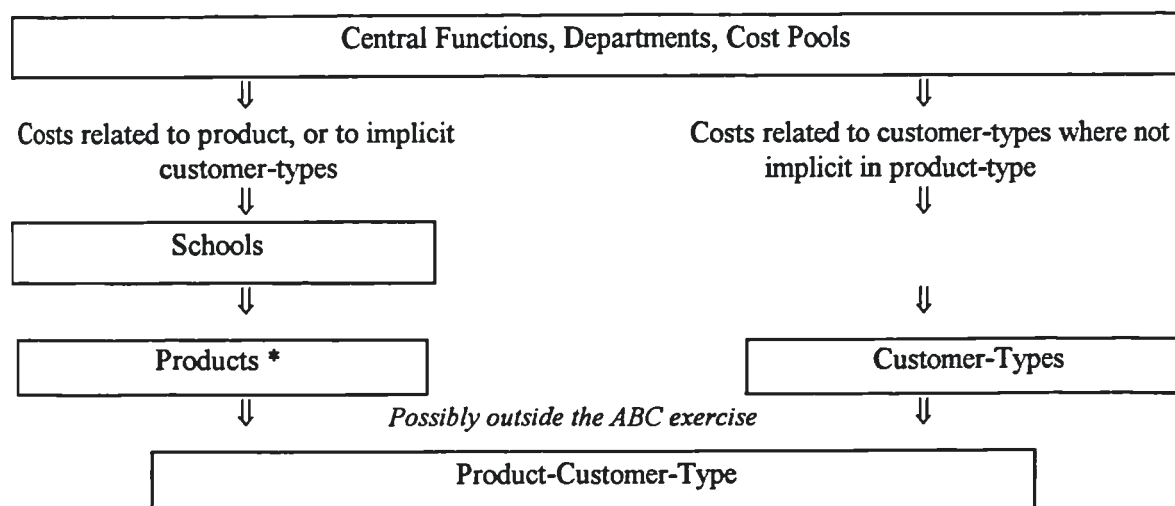
Drivers for school and product costing

For academic staff	Hours, weighted by intensity/ type of workload
For premises	Space-duration, weighted by type/quality and time/day.
For services, etc.	Single (or two) driver per function/ service, possibly weighted (eg. FTE students)

Drivers for cost management and product design

For functions, departments, schools	Full ABC analysis for the function, with multiple activities, cost pools and drivers OR Focused ABC analysis, on product attributes as drivers
For university-wide interactions	Full ABC analysis for the university, OR Co-operative action on issues arising from functional ABC exercises

Appropriate ABC cost objects, for school and product costing, would appear to be:



* For cost management and product design, additional cost objects will be needed (beyond product), in particular at the 'batch' level for groups or cohorts of students. Also, allocations from central functions will need to be direct to product where implied by causal links, or at least not aggregated (and losing detail) when passed via intermediate objects.

5.5 Theme 5: Consequences of the ABC exercise

Theme 2 considered the purposes of an ABC exercise in a university. In this theme (5) the consequences of an exercise are considered, including the success in accomplishing the original purpose, the unanticipated benefits and problems, and the actions that are (or can be) taken following the exercise.

5.5.1 The findings from the empirical data

The survey showed that overwhelmingly the original purpose (of allocation to schools) had been accomplished, and that ABC respondents considered the exercise worthwhile. The ABC exercise also seemed (as with some published ABC studies) to have led to increased recognition and understanding of cost issues within the university, including an interest in central services costs by schools, relative to service provided, and in some cases a cost pressure to reduce usage of premises.

The survey gave no indication of further use of the derived ABC costs however, apart from (in a few cases) their use in product cost. In particular there was no evidence of ABC data being used for cost management in central services, or for development of flexible budgets.

The interviews confirmed the survey findings, adding the following insights:

- There was no evident use of cost mechanisms to measure or to encourage efficiency in service departments, other than (in some cases) the freedom to vary expenditures. In particular there was no evident interest in the use of the ABC information for this purpose.
- Where there was consideration of flexible budgets for service departments, these were as likely to be linked to university income as to demands on services, thus indicating a potential problem in incorporating ABC measures.

On the latter point, the statistical analysis reinforced this finding in connection with library costs, that in some cases expenditure appeared to be partly driven by income, a variable not associated with resource consumption or service usage. In other words, while an activity analysis can determine a set of drivers that represent current usage (and thus a 'fair' allocation of expenditures to users), it does not necessarily represent a causal link to long-term expenditure. This is important to this theme in that one of the expected consequences of an ABC exercise is reduction (or redeployment) of

resources released, and this evidence indicates that this may not always occur.

There was no general evidence, in the survey, of counter-productive behaviour following from the (albeit limited) use of the data. However, an issue did arise (in the final interview) of schools reacting adversely to certain charging methods, which were broadly satisfactory in aggregate for school-level allocation, but not considered accurate or fair enough if examined at the component level.

5.5.2 Analysis

(a) Behavioural consequences of the ABC exercise

It is apparent that ABC exercises (eg. Bailey 1991), started perhaps simply as product costing exercises, have led to greater cost awareness in all levels of management. Perhaps at the root of this is the fact that to carry out an activity cost analysis in a department also triggers wider questions (eg. why do we need this activity at all?). The survey and interviews showed that these effects have occurred in universities. This included greater cost-awareness in the university as a whole, which, from the comments made, exceeded the expectations of the original designers of the costing exercise.

In this research, there was an indication of some pressure from schools for central services to be more accountable, but no general evidence that this had led to any tangible actions or changes. This could reasonably be explained by the fact that for schools each such cost was a relatively small proportion of total cost, so that although there would be an interest in reducing the cost, there would be little to gain and thus little motivation to persist with this pressure on central services.

However, while there are clear benefits in terms of behavioural consequences, the literature also warns of the possibility of counter-productive consequences. Perhaps because of the limited scope of the ABC exercises, there has not been general empirical evidence of these problems, although two issues are of note:

Firstly, in the costing exercise at Manchester, Scapens *et al.* (1994) observed that premises charging did achieve its intended behavioural effect of releasing under-utilised space, but also led to the undesired consequence that schools often chose to release space that was not usable by others. The lesson here is that cost allocations can have dysfunctional effects in universities, and that this should be anticipated and if possible avoided.

Secondly, the final interview showed that the allocation methods could also create undesirable tensions. The problem here was that relatively unrefined allocations were made, which in aggregate were a satisfactory approach to the desired purpose, but which could be readily challenged at a component level. While it could be argued that improvements at the component level were unnecessary to the original purpose, the lesson is to anticipate any such attitudinal consequences, and either prevent them by a process of education/ clarification, or else address them in the design of the costing system.

In conclusion, if cost awareness is improved in the organisation, and there is greater transparency to the allocation processes, then these processes are exposed to criticism if they are innately seen as unfair or inaccurate. There may therefore be a consequential benefit in forcing higher standards on those who determine the costing mechanisms, but a consequential disadvantage if every approximation and aggregation is to be challenged at a component level.

(b) Actions after the ABC exercise

There was no particular evidence in the research of major actions resulting from the ABC exercises, for example termination/ outsourcing of services, cost management in central services, flexible budgeting or product redesign. This leads us to conjecture:

1. Did the designers of the cost system anticipate what the ABC results might show?
2. Did the designers anticipate what actions might be taken using these results?
3. Did these anticipated actions have a bearing on the design of the exercise?

It was not apparent (from comments in survey and interviews) that the designers had typically gone beyond the first of these steps. For example, while many evidently expected the results to show cross-subsidisation between schools, it was not clear that there had been thinking about the actions that should follow. One might speculate that this occurred because the exercise was driven by finance staff, who would no doubt already have some subjective (perhaps accurate) view about cross-subsidisation to be tested, but would not have a clear view as to the actions that might arise, since these would be at a strategic level and would be based on non-financial aspects as much as financial.

What appeared to be the case with cross-subsidisation is that ABC confirmed what had already been suspected, and provided measures of this cross-subsidisation. However, it appears that in many

situations, there was little scope for action to rectify this. An example given by an interviewee was of a school that had a large permanent staffing establishment and a set of specialised laboratories, but which was suffering from reduced undergraduate enrolment, and was inevitably shown as needing cross-subsidisation for the foreseeable future. Whatever (fair/true) method used to apportion income and cost in such cases, it would show a deficit for the school and thus cross-subsidisation from other schools, and if there is little that the university can do to reduce the cost base or to increase the income stream, other than over a very long period, then the cross-subsidisation has to continue. At least one of the non-ABC survey respondents had clearly anticipated this situation, and thus had chosen not to use ABC methods, arguing that a detailed allocation would reveal deficits, but that these would then in any case have to be met by transfers of surplus from other schools.

This raises a problem for ABC. The conventional wisdom is that after an ABC exercise, actions are taken which reduce use of resources and services, following which actions are eventually taken (possibly over a long period) to redeploy or dispose of surplus capacity in these resources and services. If in a university, the prior actions are for example discontinuance of programmes, and the subsequent actions involve redeployment of staff, and if all these actions are known to be unacceptable for the foreseeable future, one could reasonably say that there may be no point in conducting the ABC exercise. In effect, even if a clear purpose for the exercise exists, and even if that purpose can definitely be achieved, then the exercise may still not be worthwhile if no actions can follow and no changes can occur. The lesson is that before embarking on an exercise, not only has some stated purpose to be defined (which may influence the design), but the consequent possibilities for (and constraints on) action need also to be clarified, which then may influence the judgement on whether the ABC exercise is justified. To fully explore the potential consequences, it would of course be necessary also to assess the likely behavioural effects caused by the exercise itself and by the dissemination of the results. In other words, there is a need to assess the overall potential change to the organisation both financially and non-financially that can occur as a result of the exercise, before the exercise is initiated.

If ABC analysis becomes more widespread (and detailed) in the future (for example if the direct academic labour content is reduced) then further issues will bear consideration in terms of the sequencing of actions. The literature shows in particular that the cost allocation system should not be allowed to legitimise a cost, with the organisation simply accepting its consequences, for example in using existing process and product costs to determine which products are to be discontinued. Johnson *et al.* (1991) for example advised that attention to product and process improvements should

precede any product mix actions, as the former actions may change the nature of the need for the latter.

The sequence of actions suggested in the literature is thus (broadly):

1. ABC exercise
2. Analysis of the potential for cost management and process redesign
3. Projection of process costs arising from (2)
4. Analysis of product cost, using process costs from (3)
5. (a) Implementation of cost management
(b) Redesign of products, and decisions on product mix
6. Reduction/ redeployment of resources released

In a university, the cost management and product mix exercises could be treated in the same way as in other types of organisation, but with two exceptions:

1. Expenditure on the library (and perhaps academic computing) is not simply dealt with as a matter of cost reduction, since much of the expenditure is viewed as adding value to the end-product. In this sense too, a flexible budget based solely on resource demands may not satisfy the needs for external perceptions of what is an appropriate level of expenditure. This issue is discussed below.
2. In terms of product mix decisions in a university, although dropping a product (eg. a mathematics degree) may appear to be a separable decision, other intangible factors (eg. external perceptions) may prevail, and it may therefore be a part of the university's chosen mission to offer a particular range of products, even if not all are economically viable.

(c) External influences on library expenditure

A difficulty with cost management in university library services is that although one might (as with other services) seek a low cost per unit, the overall expenditure is also widely viewed as a proxy for the quality and level of service provided (for example as a factor in external ratings of UK universities). Thus a high allocated cost per FTE student (a common allocation base) might not be resisted, but actually welcomed as an indication of quality. The problem is of course that although expenditures can indeed add value to the service provided, they can also go into wasteful or non-productive activities. In the empirical results, there was little evidence of the existence of service-level agreements (although there were some indications that this might change), so there is no obvious way to disentangle these two aspects of expenditure.

There are particular implications for ABC from the empirical results that provision of long-term resource for a service department may be driven partly by availability of income rather than wholly by demands on the resource/ service. For example, let us assume that several types of student are recruited, all of whom make similar demands on the library, but whose fee levels are different. A decision-relevant approach might say that a high-fee student should be allocated a larger share of library costs because of the consequent increase in expenditure made as a result of the higher income. Yet all students share (equally) the benefit of the extra expenditure, so it would seem equitable to charge all equally (as would arise from ABC). Similarly if an off-campus student is registered (eg. on a franchised course elsewhere), who makes no use of the library, then it would seem equitable to make no charge for library usage rather than charge for expenditures linked to fee income.

The problem here is that there are two separate but linked decisions:

1. Do we recruit this type of student?
2. Do we increase library expenditure, if such a student is recruited, by more or less than the resource consumption of the student?

The only way to deal with this, without producing what would appear to be inequitable consequences, would appear to be to handle decision 1 in terms of resource usage, without assuming the consequence of decision 2.

In the library there would presumably not be support for long-term expenditure that reflected idle capacity or waste, but there might well be support for expenditure that raises the quality of service (eg. extended opening hours or wider journal stock). In this sense, the university may take a decision to raise the level of service provided, which is separable from the cost-saving decisions. Library expenditure is the combined result of the two decisions, but for effective cost management and for effective product decisions, these decisions need to be viewed as separable, in particular accepting ABC allocations of cost against demands for service/ resource.

5.5.3 Summary

The survey and interviews showed that the stated purpose of the ABC exercise (school and/or product costing) was typically achieved, and that there was broad satisfaction with the results. This research did not investigate the costs of the exercise, and did not seek to quantify the benefits, so a

formal cost-benefit analysis was not possible, but from the comments made, the perceived benefits (often intangible) appeared to be satisfactory relative to the costs of the exercise.

There were clear behavioural consequences from the costing exercises:

- Greater cost awareness. This was seen as beneficial in itself, and also in terms of the pressure on central services to be more accountable. A negative aspect was the adverse effect caused where allocations were not seen as fair or accurate.
- Pressure to reduce waste of premises space. This was largely beneficial, but was not wholly successful in terms of the quality of space released.

It could be argued that the dysfunctional aspects above could be lessened by more sophisticated allocation systems, but that such effects probably cannot be eliminated within the practicable scope (and cost) of an ABC exercise.

Because of the limited scope of the (empirical) ABC exercises there was little in the way of consequential actions. However, some issues did arise relative to the range of actions possible:

- Actions to reduce/ redeploy resource. Universities are probably not willing or able to reduce resource expenditures in certain situations:
 - Where the expenditures (libraries) are seen externally as a measure of quality
 - Where the university has decided to continue certain programmes or groupings of staff, some of which cannot be justified in economic terms.
- Cost management of library services. This is complex in that some expenditures directly add value to the customer, so that 'efficiency' is problematic to define or manage.

Some specific conclusions can be drawn from all of the above. Firstly, in the initial design of a costing exercise it is important to anticipate/ forecast the likely behavioural consequences and the actions that can/ will be taken after the exercise (these actions should of course be carefully sequenced). These forecasts should then be fed back into the design process.

Secondly, a more specific point is that in the design of a costing system for libraries (and perhaps academic computing or other services), it is important to separate out the activities/ costs where efficiency is desirable, from the costs giving direct added value, where efficiency is not easily definable, and where the focus should be on cost-effectiveness. If overall expenditure is to be externally driven, then the value of the ABC exercise is not to address overall library expenditure, but to assist in better use of expenditures within the externally defined budget.

5.6 Theme 6: Alternatives and Complements to ABC

Activity-based costing evidently has a potential role in the overall costing process in a university. However, in the literature review and in the empirical results, it was clear that in the context of using ABC in a university, some other approaches are complementary to ABC, or serve as alternatives. The literature review identified the following approaches as particularly relevant in this context:

- Opportunity costing, in particular for premises
- Complements to unit costing, eg. measures of effectiveness, and non-financial measures
- Devolved decision making, with the creation of internal markets, and the need for setting goals
- Costing methods designed to influence behaviour

In this section, these approaches are considered in terms of their appropriateness as a complement or alternative to ABC.

5.6.1 The findings from the empirical data

Opportunity costing was not raised as an issue in the survey, but was mentioned in the interviews in connection with premises charges. The primary motivation behind discussion of premises charging seemed however to be to influence behaviour, rather than to achieve 'truth' so that opportunity/market costing was perhaps simply a convenient and justifiable means to set a higher charge so as to reduce under-utilisation of space. For example, one suspects that if schools over-react to this, or fail to react, then a lower/ higher charge might be set, regardless of opportunity cost calculations.

Apart from staff-student ratio (SSR) there was no mention of efficiency measures either for schools or for central services (although there were indications of increasing use of service level agreements, which might incorporate such measures), and there was no particular mention of concern about the validity of the SSR measure. The survey and interviews focused on an efficiency measure (ABC), so it is perhaps understandable that there was little mention of economy and effectiveness. All the same, it was interesting that, in terms of economy, there was no mention of the potential use of lower-cost staff (eg. teaching assistants) to achieve cost goals.

In terms of devolved decision making, many universities in the survey did not perform any allocations at all, preferring to retain much of the cost/ revenue control centrally. At this extreme,

schools perhaps see no cost information other than a consumables budget, and simply deliver agreed programmes with whatever staff and premises the university makes available. The only scope for day-to-day school financial decisions is perhaps by virement within the consumables budget. Moving along a spectrum of devolution, it was evident that virement is a common behavioural tool to encourage efficiency (and in many cases is perhaps the only such tool), and that the devolution of decision making had been enacted by the devolution of staffing budgets and in some cases premises, but not as far as decisions by schools concerning use of central services. The effect of this devolution (and powers of virement) would therefore be expected to improve utilisation and efficiency of staff and premises, and perhaps some greater economy in acquiring these resources, in both schools and services. There was no particular evidence that the devolution process would necessarily lead to an 'internal market' pricing of services between semi-autonomous units. However, some comments in both survey and interviews (eg. mention of the 'power' of schools, and of service-level contracts), did suggest this as a possibility.

In considering whether allocations/ charges are made for behavioural reasons, it was clear that this was the case for premises charges at Manchester and some other universities. The evidence is that these charges achieved the desired reduction in waste of premises space; the level of charge may ultimately prove to be of importance in this, but for most institutions it would seem that gains can be made whatever the charge, by moving from an effectively zero-charge situation. The only concern here was of schools selectively relinquishing space which the university could not easily redeploy, ie. space of low intrinsic opportunity value.

Premises aside, there was no evidence of the use of cost allocation to influence behaviour. In fact there seemed to be little freedom to act with ongoing programmes, so it may be that any motivational effect would in some cases only be measurable in terms of the changes to design of future programmes. Even this was not mentioned by survey respondents or interviewees, so presumably the motivational effect of allocations was not particularly strong.

5.6.2 Analysis

(a) Opportunity costing

Staubus (1971) presented a particularly strong argument for opportunity costing, in the context of an organisation being viewed as a set of interdependent activities. Specifically he recommended the use of future (rather than past) acquisition costs, the recognition of the value of capital assets, and the

use of variable costing where a resource fluctuates between surplus and capacity. There are clearly university parallels for Staubus' examples in the fluctuations in use of premises, and in the different workloads actually behind standard measures like 'contact hours' and 'full-time-equivalent students'.

If the concept of opportunity costing is to be utilised, then its application has to be considered separately for central services, for academic staffing, and for premises. In considering central services, often the package of services is unique (eg. Registry) and there is not a ready supply of outsourcing for comparisons, so that market valuations are not possible. However there are exceptions: catering services and printing services for example can readily be compared with external services, so that an opportunity cost valuation is possible for the services provided to schools and their staff/ students. As the ethos of ABC is to seek to establish 'true' costs, it would seem that where external opportunity cost valuations are available, then they should be used, in that being determined by market mechanisms, they are likely to be more representative of future costs than the current costs incurred internally, which potentially could include inefficiencies or surplus capacity.

Both academic staffing and premises involve non-uniform use, so that opportunity cost is potentially a means to establish differential charges. In addition, premises and staffing can move into surplus/deficit at times, thus again suggesting the possible application of opportunity costing. As discussed earlier in this chapter, the valuation of premises is problematic, so that opportunity costing through market rental valuation has the added benefit of circumventing this difficulty.

In what follows, the use of opportunity costing for academic staff and premises is considered further.

Academic staff

Academic staff typically perform a mix of work tasks including teaching, research and administration. As noted earlier (in theme 3) this represents a problematic joint cost situation, in allocating the cost of academic staff between these activities. While there are no precise answers to the joint cost issue, there are practical methods (eg. time-sheet surveys) to provide some separation.

The particular issue now is, even if the organisation can identify the proportion of time committed to teaching activities, how to allocate or charge this to courses. Following the ABC ethos, this requires a cost allocation that excludes currently surplus staffing capacity, and similarly excludes the excess costs caused by a staffing establishment that is temporarily more expensive than is required to

deliver each type of teaching.

Academic staff perform a mix of teaching activities, for example conducting lectures and seminars. A seminar could be led by a lower-paid teaching assistant or by a part-time tutor, whereas a postgraduate lecture would clearly demand a skilled and experienced member of faculty. An additional complication is that different types of contact hour may involve differences in workload for preparation and assessment. In addition different types of contact hour might involve differences in the demands/ stress on the staff member, which is only tolerable to an individual because of compensating low demands/ stress in other duties.

So it is clear that the real cost of each type of contact hour has to be related to the type of work, and it would seem reasonable to charge a course for each such hour according to the lowest cost of delivery. In particular, if a course requests a certain type of activity to be performed, capable of being delivered by a lower-cost member of staff, then it should not be penalised if provided with a higher cost member of staff. This is in effect a surplus capacity situation, where the university has resources in excess of requirements, and following the ABC ethos, this surplus capacity should not be charged out. The key principle is therefore that the tariffs are set according to the nature of the work to be performed rather than dependent on the specific type of person assigned, or on the current composition and salaries of the staff establishment.

Opportunity costing offers some assistance with these problems, by focusing on the cost of delivery of each task by the lowest cost method, and can be applied equally to research projects, administrative tasks, and other staff activities.

Premises

Opportunity costing could well be appropriate for the use of premises in a university, and does resolve the difficulties associated with valuation and depreciation of assets. University premises are particularly complex to deal with, as their patterns of usage (and thus scarcity value) vary considerably over time (for example from term to vacation and for particular periods within a week of term), and their value is also dependent on attributes like location, quality, services and capacity.

Opportunity costing of premises presents three challenges:

1. Establishing the overall market value or opportunity cost of a facility.
2. Establishing differential rates representing the opportunity cost at different times and dates

3. Establishing the charges to be made for particular usage of a facility.

It would appear that for at least conventional office space and teaching facilities, universities normally feel able to meet the first of these challenges. One of the interviewees, whose institution was planning some use of market rates expressed no difficulty with this because of the fact that the university was already renting premises on the open market.

In fact, premises can readily move between surplus and shortage (as evidenced by one of the interviewees), and market conditions can also change over a short period, thus implying changes in this form of valuation. The ethos of ABC however is a long-term view of costs, so that for opportunity costing to be consistent with ABC, there is a need for a long-term (rather than current) projection of opportunity cost. To estimate this cost, an evident approach is to use a projection of market rental rates, that ignores temporary market conditions or current surpluses or shortages of premises space in the university. Where facilities are adapted to specific uses (eg. laboratories), to the point where no external market exists, it would be necessary to establish a relative cost on the basis of comparison with the cost of those whose market value can be derived.

Assuming that some reasonable valuation can be ascribed to premises space, the second challenge is how to reconcile the differing levels of utilisation at certain times of day, days of the week, and weeks in the year, with appropriate opportunity cost valuation. This is beyond the scope of this current research, but one could conjecture some system of tariffs, adjusted for the level of demand.

The third and final challenge, for opportunity costing of premises, concerns whether the charge should reflect the use being made as well as the value of the resource being used. For example, if a course requests a room for 20 students, but only one designed for 40 students is available, should the charge be for a 20-student room or a 40-student room? Similar problems arise where a course has to be taught in expensive premises (eg. designed for some special purpose, or fitted with expensive equipment) even though there was no requirement for this. For consistency with the ABC approach, this has to be treated as a situation of surplus capacity (relative to demand) and this surplus should not be included in the costing, apart from a general provision in the charge rates to cover the surplus that is necessary to cover business fluctuations (ie. it should exclude any surplus that is the temporary consequence of a mismatch of provision to need).

So although a fixed tariff per room (per time slot) could reflect an opportunity value, a better system, in terms of the ABC ethos, would be to set the tariff in terms of what is requested rather than what is used. In a current opportunity cost sense this could also be justified in that if the course

were free to go outside the institution, in a market with a wide range of provision, then it would only pay for what it needs, based on the market value of meeting those needs.

(b) Complements to unit costing

Lapsley *et al.* (1994) noted (in the context of the UK public sector) that in assessing overall performance of an organisation, there is a need to maintain focus on three issues:

Economy - in the acquisition of resources

Efficiency - in the use of resources (ABC's domain)

Effectiveness - of the final output

Their advice is important for the HE context, and there is a need to be wary of a blinkered use of ABC in terms of efficiency, if the other issues of economy and effectiveness are ignored. In these latter areas, non-financial measures may be the norm, being more easily measurable and controllable, and providing faster and more effective feedback.

In HE, there has long been a non-financial efficiency measure in widespread use: the staff-student ratio (SSR). This has the advantage of being easy to calculate at institution and school level (and to some extent course level), and incorporates the most significant resource input (academic staff) used in producing student output. However it is weak in the way that part-time students are often handled, and in the omission of premises costs, operating costs and salaries costs, all of which leads to distortions in decision making (although some of these distortions could perhaps be removed, eg. by redefining the FTE of a part-time student). Other measures of efficiency are of course possible (eg. room occupancy rates, and utilisation factors for services), and in the absence of unit costing provide a means for measuring and improving efficiency. Strictly speaking, a comprehensive unit costing approach might remove the need for all such measures, but in practice they are popular and relatively easy to measure and understand, so it would appear that they will continue to be used, albeit as a complementary rather than primary approach to efficiency improvement.

ABC does not address issues of 'economy' directly, so it is important that economy is addressed by other means, in particular for the key resources of academic staffing and premises. ABC (as a unit cost approach) supports initiatives related to academic staffing by opening up consideration of lower cost alternatives, eg. teaching assistants and student tutors for seminar teaching, and administrative staff for administrative tasks. Similarly the assignment of unit costs (or tariffs) to premises space should assist in the future selection of the lowest cost provision for the university's needs.

Similarly, ABC does not directly address 'effectiveness'. For example, however efficiently a university manages to produce graduates, it is perhaps pointless if these graduates have been given knowledge and skills which have little value for employers or for society. Therefore 'effectiveness' has to be pursued through other forms of measurement, eg. teaching and research quality assessment, student completion rates, and student employment rates.

It could be argued that the ultimate judge of cost-effectiveness is the market, and that rather than start with ABC or internal efficiency measures, the organisation should take a market-driven approach. In this sense, the organisation might for example start by considering the full cost to the student, including the costs of fees, accommodation, subsistence and travel. In effect, rather than focusing on the organisational cost of educating a student on a particular course, the cost view would be that taken by prospective students in selecting a course and institution, which could then be related to the benefits and value that the student expects to gain. By this means there can be a determination of a course design that meets the customer needs in terms of delivered benefit as well as its end cost to the customer. ABC would then be supportive in providing unit cost information for product design, and in exposing areas of cost where the university is not competitive.

(c) Devolved decision making

In their traditional stable and centralised form, universities have made their main financial decisions centrally, limiting these largely to year-on-year allocations of resources and funding, however the recent changes in the HE context have added new complexities, to which many universities have responded with some measure of devolved responsibility for financial decisions, in particular to schools. With this devolution, the decision makers at school level are faced more directly with the cost and revenue implications of their decisions, for example where surpluses from undergraduate teaching may increase the availability of funds for research and staff development. This devolution has necessitated some form of responsibility accounting, so that managers can act with full financial knowledge of the implications of their actions, and ABC can play a part in this supply of information.

For an effective approach to devolution of responsibility, the devolved unit has to be given some goals or objectives against which to evaluate decision options. In terms of university organisational goals, Jarratt (1985) stated:

"Objectives and aims in universities are defined only in very broad terms. They usually take the form of general statements of intent to maintain and improve the quality of teaching and research across all subjects at present established in the institution."

Devolved goals should be congruent with these organisational goals, but there are evidently difficulties in moving from these broad organisational goals to specific departmental financial goals; in any case Kerr (1975) noted the common failure to design reward systems that achieve goal congruence, both generally and also specifically in universities.

However, although university goals have often been non-financial (and perhaps partly unwritten), there are indications of a move to greater specificity and financial orientation in these goals, due to funding and market pressures, so there is some greater prospect of establishing meaningful devolved financial goals. For example a university goal to bring in a greater international component to undergraduate intake would be congruent with a school goal to maximise fee income, and with an accounting system that allowed schools a higher level of fee income for such students.

Even where congruent devolved goals are set via the costing systems, these have to be set to ensure that there is incentive to work towards devolved goals, and also to ensure that devolved goals are not excessively focused on the short-term, but have congruence also with longer-term goals. For example if schools were rewarded only for short-term (annual) performance, then over-emphasis might cause a reduction in expenditures on staff development, giving immediate financial gains, but leading ultimately to a decrease in quality and thence in long-term performance.

In practice therefore, it would seem that given some reasonable specificity in institutional goals, a system of congruent devolved goals can be established, provided this is complemented with both appropriate accounting systems (including cost allocation systems) and also constraints and sub-goals to prevent dysfunctional behaviour.

An issue explored by the author in Howson and Mitchell (1995), is whether a devolved school (or department) should take a local school view of overall cost or an institutional view. For example, should a course cost estimate the real use of library and other central resources, or should it just use the top-slice charge levied by the university? It was argued that the local view is the more appropriate in that the top-slicing may have been set to encourage/ discourage certain school behaviour, so that any school attempt to look at 'true' costs would defeat this intent. The consequence might be a decision that appears financially correct in assessing the impact on institution costs, but is in fact incorrect in terms of university objectives. The argument is thus that while ABC at institutional level may be valid for the development of institutional strategy, the school should limit its ABC analysis to its own costs.

Having said that some limited devolution can be supported with costing methods like ABC, it is interesting to consider the situation where devolution is taken to the extreme, where all schools and service departments are autonomous, and operate in a free-market federal university. In this scenario, schools could choose whether or not to use service departments, and charges would be set by negotiation and in competition with external providers. While perhaps an extreme and unlikely scenario, there are precedents that suggest it is not wholly implausible. For example, to some extent this can be seen in the federal structure of universities like Oxford, Cambridge and London. In the University of London, Ochert (1995) described how the library is now self-funding from the services it provides, with schools and colleges free to opt out of the service, and with an active marketing effort to private colleges outside the university. The librarian is quoted: "I am looking towards running the library far more as a business unit".

If the consequences of a free-market model are accepted, then, at the institutional level, ABC would appear to have a diminished role; while some knowledge of cost is needed for strategic planning, much of the unit cost information will be available in the form of the negotiated inter-departmental charge rates. This is a parallel situation to that noted in the literature review concerning the development of an internal market in the NHS, which reduces the need for central determination of allocations and charges. The primary role for ABC in a fully devolved university would therefore appear to be within the devolved units themselves, as this is where decision making is taking place relative to the trade-off between costs and revenues/ benefits.

(d) Costing to influence behaviour

Caplan (1968) suggested that "the principal objective of management accounting is the influencing of behaviour". This evidently needs consideration when ABC systems are established. For example in selecting from alternative allocation bases, Kaplan and Atkinson (1989) advised that the choice of bases should if possible provide the recipient with base quantities that are clearly measurable and controllable, if the recipients are intended to concern themselves with the efficient use of the resource.

However there is also a need to consider whether a behaviourally driven approach to cost allocation is in fact preferable to the use of a 'true' cost method like ABC. It is clear from Japanese practice that cost allocations can be successfully used to influence behaviour, and in universities for example it has been noted that the allocation of premises costs has given schools an incentive to release under-utilised premises.

Dugdale (1990a) noted that while many accounting approaches can be used in combination, it is not easy to reconcile the Japanese 'influencing' philosophy with other approaches, and Merchant and Shields (1993) made a key distinction between the development of strategy (for which they believed accurate costs are appropriate), and the implementation of strategy (for which they believed behavioural considerations are paramount).

Focusing therefore on implementation issues in universities, some typical situations will be considered where a behavioural approach might be compared with a 'true' cost approach.

Firstly, consider premises charges to schools and departments. It has been argued that opportunity costing based on projected market valuation should lead ultimately to the appropriate balance of supply and demand. However, the point has also been made of the need to acknowledge behavioural effects in making changes in tariffs. One could reasonably argue therefore that opportunity costing is a useful guideline, but that it is the tariff decisions based on anticipated behaviour (and desired end-goals) that are more relevant. For example, to encourage use at off-peak times, the 'true' cost differential may not provide sufficient motivation to get staff to change patterns of working, so that an artificially exaggerated differential may be needed.

A similar argument can be made for academic staff cost, for example that tariffs charged to courses for their usage of staff, can be adapted so as to better achieve university goals, with lower cost staff (or tasks) charged at an artificially reduced rate so as to encourage course designers to avoid more expensive staff resources. The normal ('true') differential might have some effect, but an artificially larger differential may be needed to provide the stronger motivational effect needed to influence the behaviour of the design team. In the same way, charge rates to 'desired' activities could be adjusted artificially, eg. to encourage/ discourage particular types of course development or research activity.

A similar argument can be extended to the use of other resources and services. For example, if the library passes on the full cost of inter-library loans, it may deter students (and schools) from using this facility altogether, so it could be argued that a lesser charge is appropriate if the university believes it to be important to encourage this activity. Another example (from the literature) is the charge for printing services, which again can be addressed from a behavioural viewpoint. Finally there are services (eg. quality or safety related), where it would not be desirable to deter usage, and where it might be decided not to charge at all for their usage.

Behavioural arguments are clearly compelling, but it would not appear to be practicable to make all allocations behaviourally driven. Firstly, there are situations where there are no particular behavioural arguments for modifying 'true' costs, and secondly there will be situations where a behavioural approach might be advantageous but where there is no knowledge of the cost/ behaviour relationship. In these latter situations, 'true' costs would seem a valid starting point, at least until information becomes available on the behavioural effects. So it is plausible that ABC provides the foundation for the cost allocation approach, but that it should be adapted or replaced in the situations where there is some understanding of the behavioural effects, and where the 'true' cost is clearly not optimal in terms of behavioural consequences.

A final consideration is Yoshikawa's (1994) 'kousuu' approach, which allocates according to resource consumption. If the university is constrained long-term by certain resources, then it would seem pragmatic to load greater overheads onto these resources, so as to discourage their use. If a university for example is constrained long-term by a fixed set of premises, then it is arguable that the university should load costs onto premises, so as to discourage wasteful use and to promote less premises-intensive approaches to revenue generation. Similarly if the bottleneck is the HEFC limit on the number of funded students, then the argument would presumably be that HEFC funded students should bear the cost burden, thus encouraging schools to reduce their input of these students and concentrate on full-cost students or on non-teaching activities. This appears to be a justifiable approach, and consistent with short-term approaches to *resource constraints, like throughput* accounting and opportunity costing.

However, it has been argued that for constrained resources, charges can and should be applied, with sensitivity to the likely behavioural response; the kousuu method restricts this approach and therefore risks an over-reaction to the charges. All the same, a lesson can be drawn in terms of choice of drivers, in that on balance it would seem preferable to choose a driver linked to controllable consumption of resources or services, rather than to uncontrollable consumption or to output volumes.

In particular, where there is a choice, this would argue against using the number of students as an allocation base, in that the recipient of the allocation is powerless to respond, given that it is also a key driver of revenue. So for example, if there is a choice, allocation bases like number of staff, usage of premises, or number of student transactions, would be preferable. This philosophy would also argue against allocations on revenue, and a corollary is that it also of course suggests that top-slicing of income, whose only behavioural effect is to deter the generation of income, could be better

replaced by a resource-linked cost allocation.

5.6.3 Summary

Opportunity costing is a logical complement to ABC, in that it seeks to establish 'truth' in allocated costs, in particular by dealing with anticipated surplus or scarcity of resources, and with variable patterns of usage. For service costs, it can in some cases be defined by the charge rates of external service providers, and it would seem good practice to make use of these measures, so as to bypass the difficulties of identifying surplus capacity or inefficiency in current operating costs. For academic staffing and premises, opportunity costing has some key benefits, although initial changes should be implemented cautiously until behavioural effects are understood. For academic staffing:

- It provides a means to assign tariffs to different types of activity and workload.
- A principle is: the charge should be for the type of work performed, based on the lowest cost of delivery, and not based on the salary costs of the person doing the work.

For premises:

- It provides a means to assign tariffs to different types of premises and different times/ dates of usage.
- It circumvents the problems associated with asset valuation and depreciation.
- A principle is: use projected market rentals rather than current (short-term) opportunity cost.
- A principle is: charge for what is requested, rather than for what is provided.

ABC is primarily concerned with efficiency, but it is important to complement this with measurement (and improvement) of economy in acquisition of resources, eg. use of lower-cost teaching assistants to conduct seminars. It is also necessary to monitor the effectiveness of the final output, eg. by quality assessment and student employment rates. One means of addressing cost-effectiveness is to establish target delivery costs through a market-driven approach using a customer's view of overall cost. Non-financial measures for economy, efficiency (eg. SSR), and effectiveness also provide easily-measurable, and rapid, feedback to complement unit cost approaches.

The devolution of decision making to schools and departments implies a lesser institutional role for ABC, if inter-departmental allocations are not centrally determined but are the result of negotiation between the source and recipient of the allocation. While there may be some institutional level ABC analysis for strategic decisions, the main focus for ABC can and should move to the activities within the devolved units. In this scenario, it is important that the goals set for devolved units are congruent

with institutional goals, and it would seem that some additional sub-goals and constraints would be needed to achieve this, and to avoid dysfunctional behaviour.

For the implementation of strategy, behaviourally driven costing approaches appear to be of value, since:

- 'True' cost differentials may be insufficient to provide the motivation to change work patterns or product designs.
- 'True' cost may cause over-reaction, or dysfunctional behaviour (eg. discontinuing programmes rather than attempting to improve their efficiency).
- Some services will need to be charged above/below cost to discourage/encourage usage.

Although ABC provides a good basis for charges, it should therefore be modified where there are desired behavioural goals, or uncertainties about behavioural response. The 'kousuu' approach (to influence the consumption of resources) would in particular suggest that where there is a choice of ABC drivers, the organisation should select those based on controllable consumption of resources or services, and avoid those linked to output (eg. student numbers and revenues).

Chapter 6 Conclusions and Implications

This chapter reviews the findings of the previous chapters, and in particular identifies what this research has added to the body of knowledge as defined by the literature review.

The starting point for this research was that although ABC had been included in normative costing advice for UK universities, there had been little documented use of the approach. There were (for the researcher) concerns that this normative advice might therefore be incomplete or inappropriate, and that there was a need to develop the concept of ABC methodically for the university context both from theoretical principles, and from such empirical evidence as was available.

The review of literature in chapter 2 established that much current normative advice was indeed incomplete, and was also at times inconsistent with the 'ethos' of ABC, ie. assessing the long-term impact on demands on resources through cause-effect relationships. This review also indicated an appropriate framework of 'themes' for gathering evidence and developing arguments, each theme representing a grouping of costing issues identified in the review.

The empirical work (survey, interviews, and statistical analysis) answered certain research questions related to the current state of usage in UK universities, the specifics of context, the purposes behind the use of ABC and other allocation methods, and practical issues arising from its use (eg. behavioural consequences). Arguments were then developed based both on this empirical evidence and also on the published evidence and theory from other contexts, as to the implications for ABC in the UK university context.

The objectives of this research were to develop the concept of ABC in the UK university context, analysing and evaluating relationships to other forms of costing. These objectives have been met, and the specific findings are identified in the next section, categorised according to the research themes. A further objective was to determine the implications for management accounting practice arising from this research. These implications are presented in section 6.2.

A further section summarises the implications raised more generally for ABC, applicable to other contexts. The chapter concludes with suggestions for opportunities for further research, arising from this current research.

The originality of this research is that it has added a new set of empirical data to the ABC domain, it has developed through analysis an extended view of the applicability of ABC, in particular in the university context, and it has developed arguments relating ABC to the purposes of costing and to alternative costing approaches, some of which are extendible outside this context.

6.1 Review of findings

The overall conclusion of this research is that ABC can be of value in a university, but that current normative advice is weak, in failing to employ established ABC practice (eg. relative to exclusion of surplus capacity), in failing to relate the ABC design to the purpose intended, and in failing to consider behavioural issues, in particular where authority has been devolved.

The findings, concerning the applicability of ABC in a university, include:

- a single ABC design is not appropriate for multiple purposes (eg. school costing and cost management).
- there is an increasing need to attribute costs to customer-types (ie. not just products).
- there is a need for multiple definitions of 'full-time equivalent (FTE) student', when used as drivers, each definition involving weightings appropriate to the type of activity.
- although some expenditures are partly determined by factors other than cost drivers, this does not invalidate the ABC approach in allocating these expenditures.
- opportunity costing is a practicable and consistent complement to ABC for services, academic staffing and premises.
- ABC requires adaptation in the light of behavioural effects, particularly to ensure goal congruence in the product decisions made within semi-autonomous academic schools.

The findings are elaborated below in detail according to the research themes.

6.1.1 The university context

Costing systems should be selected and designed to match the context in which they are placed, and it has always been clear that universities have a distinct context. In this research the contextual issues have been explored as they relate to ABC implementation, through consideration of other related contexts, and as arising from the empirical data collected and analysed. What has been added to the body of knowledge is an identification of the set of contextual factors that make a UK

university unique from an ABC viewpoint (summarised in 5.1.3). This identification is important in guiding the usage of ABC, but also may be helpful in identification of similar factors in other contexts (eg. expenditure treated as an external indicator of quality).

6.1.2 The purposes of an ABC exercise

Costing systems should also be selected and designed according to the purpose of the costing exercise, however this has not been explored adequately in the literature relating to ABC in universities. The arguments in this research have added the following to the understanding of the relationship between ABC and the purposes within a university:

- (a) Purposes can be classified according to the use made (eg. school costing) and the philosophy behind the choice of methods (eg. fairness or truth) (summarised in figure 5.1).
- (b) Current normative advice concerning ABC in universities is inadequately linked to purposes (eg. failing to address the difference in detail needed for cost management v. product costing), and inappropriately linked to financial accounting information (eg. failing to exclude surplus capacity) (Current normative advice is reviewed in the latter part of 2.4.5).
- (c) The appropriateness and the design of an ABC system is dependent on the specific purpose of the exercise, and is also influenced by the extent to which costs of academic labour and premises are dominant. There is thus a need for different ABC systems, to support the various purposes, ie. one ABC cost system is not sufficient for multiple purposes like school costing and cost management. The relationship of ABC to purposes is summarised in figure 5.2, with an indication of the anticipated shift in emphasis/ use in the future.
- (d) Sophistication in cost analysis in determining school or product surpluses is in some cases not cost-effective because of the greater variability in the surplus caused by imprecision in income definition (this imprecision is discussed in 5.1.2 (c)).

6.1.3 The costs to include in the ABC exercise

If an ABC exercise in a university is to reflect the total cost implications of activities, then it is important that the costs being allocated are appropriately measured and/or estimated. This research has added the following to the understanding of the treatment of university costs in the literature:

- (a) There is an increasing need to identify separately those costs which are attributable jointly to customer-types and to products. These costs include marketing/ promotion/ agency commission, (identifiable to particular markets), and subsidies for accommodation etc., as well as any significant incidental costs/ revenues, identifiable to particular types of student. The consequence is that product cost becomes specific to customer-type (The issue of customer costing is examined in 5.4.2 (b), and jointness with product in 5.3.2 (a)).

- (b) While full absorption costing may be appropriate for inter-university comparisons, for allocation of costs to schools for financial accounting purposes, and for funding arguments, it is not appropriate for the determination of the long-term cost implications of activities, if fixed costs exist that are clearly independent of long-term activity levels. Thus for long-term decision purposes (eg. for resource re-assignment to schools, cost management, product design, and product mix decisions), these costs should be excluded from the ABC analysis. However, while such costs are not an intrinsic part of the cost of activities, processes or products, these costs must presumably be normally covered by contribution from these products (see 5.3.2 (b) for this discussion).
- (c) In central services, in what are treated as variable costs (eg. libraries) there is a possibility of a long-term fixed element (which may be implied by economies of scale), albeit difficult to identify because of compensating changes in service levels. In central management and services, what are often considered as fixed costs are partly related to the overall scale of operation of the university, and thus do contain long-term variable elements (discussed in 5.3.2 (b)).
- (d) Following the cause-effect ethos of ABC, interest paid on debt or received on deposits/ investments should only be treated as fixed if the causal capital movements were independent of any university activity. Where there is dependence, interest should be allocated according to the appropriate drivers (discussed in 5.3.2 (b)).
- (e) In defining the allocation basis for shared teaching premises, the principle should be 'normally achievable utilisation', taking account of the need to cover fluctuations in the number of students to be accommodated, and the normal pattern of usage (time/ day/ date). In defining the allocation base for a service (eg. registry), drivers based on 'normal working capacity or output' should be used, rather than current output levels if these are untypically high or low. These approaches are needed for consistency with the ABC principle of exclusion of temporarily surplus capacity, except where it is a consequence of the provision of capacity to cover normal business fluctuations (discussed in 5.3.2 (d)).
- (f) Activity levels are sometimes supported by expenditure that occurs infrequently, eg. as capital expenditure. For consistency with the ABC philosophy of linking cause to effect, any such expenditure with multi-period benefit, whether or not capitalised in the financial accounts, should be allocated across multiple periods, rather than wholly to the current period. In particular, this would include course/ programme development. For completeness of the view of cost, and for consistency with the ABC approach, these period charges should allow for cost of capital and inflation, and should be allocated according to the causal drivers (discussed in 5.3.2 (e)).

6.1.4 Carrying out the ABC exercise

Once activity costs are identified, the design of the ABC exercise focuses on the selection of cost drivers for activities, and on the cost objects to which allocations are made. This research has added the following to the understanding of these selection processes in a university:

- (a) Full time equivalent (FTE) students are commonly used as an allocation base. However, the standard weightings used for the FTE calculation cannot reflect the variety of impact of different types of student on activity levels (This was demonstrated (see 2.4.5) by Jones (1986) and Doyle (1991), yet such examples have been largely ignored in current normative advice). Where weightings are used then, on a case by case basis, there should be an estimate of the relative workloads (eg. differentiating level (undergraduate v. postgraduate), and study mode (full-time v. part-time v. industrial placement v. distance learning)), with potentially a separate FTE calculation for each major activity; judgmental weightings, based on some very limited analysis, would seem to be better than uninformed assumptions that standard FTE weightings are appropriate. This is an important refinement of the ABC analysis, even if used only for school level allocations, as the errors in inappropriate weightings are known to have a consistent bias, at least for part-time students, rather than a random bias that reduces with aggregation (discussed in 5.4.2 (a)).
- (b) For cost management in university service departments/ functions, detailed selection of drivers and intermediate cost objects is necessary. If carried out as isolated exercises, detail may be absent in the inter-departmental allocations, so that cost pressures may be similarly absent or possibly dysfunctional. Thus to fully manage costs in such a department, where decisions external to the department can impact its costs, the internal cost management has to be complemented with separate inter-departmental analyses and actions (discussed in 5.4.2 (a)).
- (c) For cost management and product design:
 - (i) it is not satisfactory to use schools as intermediate cost objects (between services and the product) if this involves a loss of detail in the service-product relationship, for example if there is aggregation of allocations based on different drivers, since it is the detail that is the focus of the cost management and product design exercise.
 - (ii) for courses, a 'batch' level of cost object (cohort or class) is necessary so as to be able to address economies of scale, as well as the cost of course proliferation.
 - (iii) to ensure proper attention to the cost implications of product design choices, the ABC exercise should include the attributes of products as drivers (discussed in 5.4.2).
- (d) 'Customer' as a cost object is often implicit in the definition of product in a university, so generally there is no separate concern over customer costing. However, some customer types

and markets do involve distinct and significant expenditures, which need to be addressed as such in the cost analysis, and not subsumed as simple product costs (discussed in 5.4.2 (b)).

6.1.5 Consequences of the ABC exercise

The following arguments have been added to the understanding of the application of ABC in a university, in relation to the consequences of ABC exercises:

- (a) Allocations made for a specific purpose will involve some degree of approximation in arriving at a compromise between costs of the exercise and overall accuracy of the allocations. Although for this purpose it may be acceptable to have poor approximations at the level of individual components, this may not be satisfactory if there is a (non-desired) focus by recipients of allocations on these component charges. Therefore to avoid dysfunctional behaviour, the approximations should be such as to be seen as reasonably true/fair at component level, even if this is unnecessary for the original purpose (discussed in 5.5.2 (a)).
- (b) A stated purpose for an ABC exercise (eg. "determine areas of cross-subsidisation") does not automatically lead to worthwhile actions, and may create dysfunctional consequences. Anticipation of these actions and consequences may in fact suggest modification and clarification of the purposes, and thus a revised design for the ABC exercise. Therefore, the design of a university ABC system should anticipate both the behavioural consequences and also the sequence of actions expected to arise following the exercise, particularly since these actions will often be constrained by mission/ policies and external perceptions (discussed in 5.5.2 (b)).
- (c) Cost management for a university library (and possibly other academic services) cannot focus simply on cost reduction and efficiency, as some expenditures add direct value to the product, and overall expenditures are partly driven by external perceptions of quality. The focus for ABC should therefore be to reduce costs in non-value-added areas, so as to enable expenditure increases in value-added areas (discussed in 5.5.2 (c)).
- (d) Library (and possibly other) expenditures may be partly driven by availability of income. An ABC allocation on the basis of demands on resource/ service is however preferable to a decision-relevant approach based on incremental university income, in that the latter would lead to inequitable treatment (discussed in 5.5.2 (c)).

6.1.6 Alternatives and complements to ABC

Several approaches are complementary to ABC in improving its overall effectiveness, and some of these approaches serve also as alternatives to ABC. This research has added arguments in support of modifications to the ABC methodology in a university context:

- (a) Opportunity costing provides a means of establishing both differentials between the allocations/ charges for different types of academic staff activity, and also charges for premises usage that take account of differences in type/ quality (and to some extent time/ date). However, for consistency with the ABC ethos of *long-term* valuation of resources, account should not be taken of temporary phenomena related to over/ under supply of resources. Following this logic, allocations of academic staff should be for the type of work requested, based on the lowest cost of delivery, and not for example based on the salary costs of the person selected to perform the work. Similarly, opportunity costing of premises should be long-term projected market rentals, and not short-term opportunity cost valuation, linked to these temporary phenomena, and premises charges should be based on what is requested rather than on what is provided (discussed in 5.6.2 (a)). In fact it may be difficult to establish differential rates for premises charges by time/ date, through opportunity costing, and a more feasible approach may be to establish and refine a set of tariffs according to desired behavioural effect (eg. to encourage design of programmes that make off-peak usage of premises) (discussed in 5.6.2 (d)).
- (b) In implementing strategy, 'true' ABC allocations may not provide optimal institutional results due to behavioural effects, in which case the allocations should be modified where there are desired behavioural goals or uncertainties about behavioural response. In particular, universities should consider: overcharging to discourage waste and to steer product design, undercharging to encourage use of a service, and (where practicable) giving preference to allocation bases linked to controllable consumption of resources/ services, rather than those linked to product volumes or revenues (discussed in 5.6.2 (d)).
- (c) Where there is devolution to schools, then the use of ABC to determine inter-departmental allocations is to some extent supplanted by negotiation processes, and top-slicing mechanisms. In these circumstances, it has been argued here that decision making at school level can and should take a school rather than institutional view of costs, in that this is more likely to produce school decisions that are congruent with university goals (discussed in 5.6.2 (c)).

6.2 Implications for ABC in a university

The findings in the previous section do affirm the value of ABC in UK public sector universities, but have a number of implications as to the conduct of the ABC exercise, many of which are at variance with some of the normative advice currently offered, eg. in JFC (1997).

6.2.1 Initial tasks

Firstly, before commencing the ABC exercise, the following tasks need to be undertaken:

- (a) Clarify contextual factors that could be important in the design of the exercise, in particular in anticipating the likely consequences (see finding 6.1.1).
- (b) Clarify the purpose of the exercise (The tables in 5.2.3 may be helpful for this). If there is more than one purpose (eg. inter-school comparisons, and product costing) then expect to use more than one level of detail, and more than one ABC system, ie. understand that a single ABC system cannot properly address multiple purposes. For any purpose other than external reporting, understand that some of the information in the financial accounts will be unsuitable for the exercise (see 6.1.2).
- (c) Consider the likely sequence of actions that will follow the exercise, and the likely behavioural consequences, and then adapt the exercise design in the light of these projections. In particular be aware that recipients of allocations will expect some reasonable cause-effect link (or at least some fairness) to be represented in the allocation method for each cost category (see 6.1.5 (a),(b)).

6.2.2 ABC ethos (long-term view)

Secondly, given a decision-oriented purpose, the exercise needs to be conducted according to the ABC ethos of projecting long-term cost behaviour, including:

- (a) Use projected future costs, not historical/ current costs, unless these are representative of future costs (eg. see Innes and Mitchell (1990), referred to in 2.4.2).
- (b) Do not allocate surplus capacity, or costs that are clearly fixed, with no possible link to the scale of long-term university operations. In general however, accept that most costs described as 'fixed' (ie. in the short-term) may be so linked, albeit that a long-term fixed element may exist in some cases (see 2.4.2, and findings 6.1.3 (b), (c)).
- (c) Allocate services according to normally achievable capacity/ output, but use opportunity cost valuations if available (eg. charges made by external service providers) (see 6.1.3 (e) and 6.1.6 (a)).
- (d) Value premises according to long-term market rental equivalents, and allocate premises costs according to normally achievable utilisation (see 6.1.3 (e) and 6.1.6 (a)).
- (e) Allocate costs with multi-period benefit to multiple periods regardless of their treatment in the financial accounts (see 6.1.3 (f)).
- (f) Charge premises usage and academic staff usage according to the nature of the recipient's requirements, and not according to what is provided (ie. the recipient of allocations should not be penalised by a current institutional mismatch between requirements and provision, involving

surplus capacity/ capability) (see 6.1.6 (a)).

6.2.3 ABC ethos (other aspects)

Some other design aspects are recommended, that are consistent with the ABC ethos:

- (a) If schools are used as intermediate cost objects in the allocation of a service to a product, then do not aggregate at school level if this loses detail of drivers, and if this detail is needed at product level, in particular for product design decisions (see 6.1.4 (c)).
- (b) Avoid over-precision in costing where the purpose (eg. school or HEFC course profitability) is compromised by a lack of precision in income definition (see 6.1.2 (d)).
- (c) Expect to go into considerable activity/ driver detail if the purpose is cost management, beyond the level of detail needed for school or product costing (see discussion in 5.4.2 (a)).
- (d) Where costs are identifiable to types of customer (eg. local students not requiring accommodation subsidies, or promotional activity and agency commissions for overseas markets) then they should be maintained as a customer cost, and not allocated simply to product (see findings 6.1.3 (a) and 6.1.4 (d)).
- (e) Interest payable/ receivable should be linked where possible to the activity that caused the capital deficit/ surplus to occur (see 6.1.3 (d)).
- (f) 'FTE student' is commonly considered as a driver. It should only be used for each specific purpose, if the implied weightings are judged to be the most appropriate in terms of demands on services/ resources, in particular as to the distinction between study modes (full time, part time, industrial placement, distance learning) (see 6.1.4 (a)).
- (g) For cost management and product design, the analysis should expressly consider the cost/ activity impact of product attributes as drivers, even where their impact is low relative to other drivers (see 6.1.4 (a), (c)).
- (h) For course costing, some costs will need to be identified to classes/ cohorts, and not just treated as a per-student cost, if there is any intention to consider the costs of course proliferation or economies of scale (see 6.1.4 (c)).
- (i) If a detailed ABC exercise is conducted within a single service department, for cost management purposes, understand that this needs to be complemented with separate analyses on how actions in other departments/ schools might also support cost reduction (eg. schools reducing unnecessary course applications processing in registry by informing potential applicants of acceptance criteria) (see 6.1.4 (b)).

6.2.4 Contrary to ABC ethos

Some design aspects are also recommended, that are not consistent with the ABC ethos. These modifications to the ABC system are recommended as likely to better achieve long-term organisational objectives than if 'true' ABC costs are adhered to:

- (a) Establish allocation differentials for different types of academic staff activity and for different types/ times/ dates of premises usage, using opportunity costing as a starting point if practicable, but adapting to desired behavioural effects (eg. in steering product design to use lower-cost staff and off-peak premises time) (see 6.1.6 (a)).
- (b) Where 'true' allocations of services would clearly not produce desired behaviour, then ABC allocations should be modified (eg. to encourage/ discourage use of particular services). Where there is a choice between several plausible allocation bases, then select bases linked to controllable consumption of services/ resources and avoid bases linked to product volumes (eg. students) or revenues, so as to influence behaviour to reduce resource consumption (see 6.1.6 (b)).
- (c) In a devolved university, where school-level decisions are likely to be based on a school rather than an institutional view of costs, make allocations to schools according to what will best steer schools towards overall institutional goals. Having done this, encourage schools to take a school (not institutional) view of costs (see 6.1.6 (c)).

6.2.5 Overall focus

Finally, an overall reminder is warranted that ABC can be overly introspective in terms of focus on internal efficiency. It is important to complement this efficiency focus with other initiatives, including in particular:

- (a) seek to improve the economy with which resources are obtained, and the effectiveness of the final output, often best gauged by non-financial measures like completion and employment rates (see 5.6.2 (b)).
- (b) seek to improve the long-term performance of the university by 'quality' measures (eg. staff development activity, and quality ratings for teaching and research. The ultimate development of this could be an adaptation of the 'balanced scorecard' (see the final part of 2.3.1).
- (c) take a market-driven view of cost as perceived by the customer, including, for a student, the cost of text books, travel, and accommodation (and perhaps loss of earnings), as well as the course fees charged. This should enable a broader search for cost reduction opportunities, and may also identify some competitive strengths to exploit, or weaknesses to circumvent (see 5.6.2 (b)).

6.3 Implications for ABC in other contexts

A number of the implications for ABC in universities are connected with the implementation of 'standard' ABC theory, advising on how this theory can be adapted to the specific context, and endeavouring to rectify deficiencies in some of the current advice given to UK universities.

However, there are also some implications for ABC practice in a more general context, beyond the conventional implementation of the ABC methodology.

Normative advice indicates that the design of costing systems (including ABC) should relate to the context, and to the purposes intended. It is suggested in this research that these two issues should be addressed in a formal manner, (a) identifying the specific aspects of context that could impact the cost design and the use of the results, and (b) identifying precisely the purposes both in terms of the mechanisms (eg. product costing for product mix decisions), and also the philosophy involved (eg. being clear whether 'truth' overrides issues like fairness and linkage to financial accounts). It is also suggested that at the design stage, some effort is made to forecast the likely results, and thence the likely sequence of actions that will be taken, as well as any expected behavioural consequences; these projections may then indicate possible refinement of the design.

It has been argued here that one ABC system is not sufficient to meet multiple purposes, given the increased need for detail for some purposes (eg. cost management), and the pressure to reduce unnecessary detail because of the time and cost of the exercise. Kaplan (1988) argued that for multiple costing purposes, "one cost system isn't enough", and this has been extended by arguing also that one ABC system isn't enough.

In implementing ABC in a university, it has been argued that a number of detail points are important for consistency with the ABC ethos. Of these, the following would appear to be more widely applicable:

- (a) Opportunity costing is consistent with the 'truth' ethos of ABC, but opportunity cost valuations of premises must also be consistent with the 'long-term' ethos of ABC, for example using projected market rentals, rather than valuations related to current shortages or surpluses.
- (b) Users of services or resources should be charged for the service they require, at the lowest potential cost of delivery, and not what is provided, if different. To value the service requirement, opportunity costing may be of value (eg. comparison with similar organisations or

with external provider rates).

- (c) Where costs are attributable to customer-types, then if there is no relationship to product volumes or characteristics, they should not be allocated to product. If there is a joint relationship between product and customer-type, then it is suggested that the presentation of product cost is as a cost for each combination of product and customer-type.
- (d) Where demands on services are related to product characteristics, then detail of the relationship is important to some purposes (eg. product design). In this case there should not be aggregation of the service allocations at intermediate cost objects (eg. production departments) if this loses the necessary detail.
- (e) Where activities are linked to the generation of temporary working capital deficits/ surpluses, then an interest cost/ credit should be applied to the activity. Similarly, where expenditures giving multi-period benefit (eg. fixed assets) are allocated to these periods, for completeness of the cost calculation, there should be an allowance for the cost (or opportunity cost) of capital.
- (f) If an ABC exercise is conducted as a cost management exercise on only one part of the organisation, then it will miss issues that would arise from detailed interactions (and allocations) with other parts of the organisation. *This does not invalidate the cost management exercise, but it does require that some complementary investigation is conducted, in case actions taken externally can achieve cost savings also.*
- (g) There is a particular issue where levels of expenditure are determined without a complete dependence on demands made on services / resources. This could arise where expenditures are perceived externally as a measure of quality (eg. expenditures on safety and the environment), or where they are partly dependent on the availability of income/ profit (eg. perhaps expenditures on the quality of office accommodation). This does not invalidate the ABC approach, but it does imply that the ultimate consequence of the ABC exercise will be redeployment within the cost category rather than a reduction in expenditure. In particular it would invalidate attempts to use regression methods on expenditures to determine the best choice of drivers.

If ABC is to achieve its potential benefits, then it would seem appropriate to maintain a consistent ethos (eg. of 'true' long-term costs) in the approach to the allocation of those costs not readily linked to activity levels, as above. However, it has been shown in the literature that in implementing (rather than developing) strategy, the quest for 'true' costs does not always achieve the best overall organisational results, where behaviour is taken into account. The arguments made in this research for the university context do support the modification of the ABC approach in these situations, for example over/ under charging to discourage/ encourage use of services, and to influence product

design. In particular it has been argued that to establish differential charges for types/ times of usage of premises (or other resources), although opportunity costing sometimes provides a starting base, the use of a set of tariffs that is refined over time according to the behaviour of users is an effective approach. The arguments here also have a bearing on decentralised organisations, where the organisational unit (often without knowledge of organisational-wide cost information) takes a localised view of cost (related to the charges to and from it) in its decision making. In this situation, ABC may have a role in organisation-wide strategy, but for many purposes, it becomes limited to cost allocations within each organisational unit, with inter-unit allocations being determined either centrally (so as to encourage goal congruence), or by some pseudo-market mechanism.

A final point related to behavioural effects, concerns the principle of loading costs entirely onto resource/ service inputs ('kousuu'). It has been argued here that this can be too extreme, but that the principle leads to the advice that ABC designers faced with a choice of drivers should err towards those that represent controllable consumption of resources, and away from those related to product volumes or revenues.

Finally it is clear that ABC is not sufficient on its own, as an approach to management costing, but needs supplementing with a range of other approaches. A customer view of cost for example may comprise more than the obvious selling price of a product, and cost reduction efforts can be equally important in this area. Efficiency in use of resources has to be matched by economy in their acquisition, and cost-effectiveness in the output, particularly where (as in the public sector) market mechanisms may be less effective at ensuring this. In addition, non-financial measures (eg. of product quality and staff skills development) require attention (eg. by methods like the balanced scorecard) as these may be the ultimate determinant of long-term financial performance.

6.4 Opportunities for further research

6.4.1 Limitations of current research

This research has been focused on UK public sector universities, where a specific context and set of purposes has been argued to lead to a particular role for ABC. Many issues have arisen that are thus specific to this context, although some have evidently a wider potential applicability, as outlined in the previous section. The key limitation of this research is of course its restriction to a particular type of organisation, and to consideration of a particular aspect of performance (efficiency). So the

findings and conclusions drawn are restricted to what could be achieved within these limitations.

Methodologically, the survey and interviews were of course subject to various causes of error and bias, to which these methods are always susceptible. However, the focus has been on identifying issues, so error and bias may have been lesser difficulties than if the focus had been on quantifying/ measuring.

Beyond UK public sector universities, there will inevitably be contextual differences, in UK private institutions, UK public sector FE colleges, and institutions in other countries, where for example the specifics of HEFC funding are replaced by other funding issues. This research may have relevance to all of these sectors, but this has not of course been explored here.

The statistical work was conducted as a means of triangulation on a particular set of cost data. Again, the methods and findings of this research may have wider relevance, but were limited by consideration of only one aspect of costs (libraries), and also limited as to the use of a particular publicly available data set.

Methodologically, the strong cross-correlations between driver variables made it difficult to identify individual variable effects with statistical significance, and the conservative approach taken here meant that the range of results was limited. The lack of clear definition of some variables (eg. external borrowers) may also have contributed to these difficulties of obtaining statistical significance, but generally the variables were well defined in the data source.

The research did not include 'case-study' examination of any institution in detail, for example investigating each allocation mechanism in terms of drivers used (and their rationale). So although it was evident for example that the use of FTE students as a driver could involve bias relative to part-time students, this research did not attempt to measure the bias. Similarly there was not the detailed level of interviewing of functional managers that might reveal behavioural aspects of the allocations.

The research also did not attempt to investigate the motivation for carrying out ABC exercises, for example as to whether certain conditions/ history/ personalities combine to make it more/ less likely that an exercise will be carried out.

6.4.2 Suggestions for further research

There are several ways in which further research could build on (and improve) the current research.

(a) Firstly, for UK public sector universities, the following could be explored:

- Case study examination of individual institutions. Through detailed examination of ABC exercises, it should be possible for example to determine the nature of the bias in FTE calculations (see 6.1.4 (a)), and the loss of detail caused by school-level aggregation. It may also be possible to quantify the benefits from using ABC for cost management for particular functions, and generate from these cases some general guidance for universities. It may be possible to investigate attitudes to allocations so as to provide some indication of both the conditions that lead to the initiation of ABC exercises, and also the behavioural consequences that arise from the allocations.
- Sector-wide studies of individual functions (eg. registry, library services, and central management). This could establish which drivers are typically important and could provide a framework to guide and simplify ABC exercises in individual institutions. A guideline FTE calculation could also be established for each type of university activity; this could provide some sector-wide improvement in cost allocation, by at least removing bias from many student-based allocations. It is possible that statistical exercises could be of value in this, although this can be complex, particularly because of strong cross-correlations in driver variables, and is limited to the availability of driver-level data.
- Development of the concept of opportunity costing for academic staffing and premises. It has been shown that opportunity costing is a rational adjunct to ABC, and that for academic staffing and premises there is the possibility of the development of tariffs for different types of staff activity and different types/ times of premises usage. The goal of such research would be to develop a set of tariffs that is internally consistent, and where individual tariffs are consistent also with external/ market valuations, where such comparisons are possible.
- The rationale for income allocation. The internal allocation of HEFC income appears to be as important for some decision making as cost allocation. The allocation may (as with costs) be carried out to achieve 'truth' (eg. by replicating the HEFC formula used to assign funds to the university), by fairness (eg. so that all staff share similar workloads), or behaviour (eg. allocations chosen so as to provide incentive to meet university goals). Research is possible into the rationale for the method used, and into its consequences, with an end result of guidance for universities, to link with that given for costing.

- (b) Beyond measures of efficiency, in UK universities, there is scope for research into measures of cost-effectiveness, and in particular the use of the 'balanced scorecard' approach, which aims to establish aspects of current performance that are important to long-term success. In universities there are assumptions for example that staff development leads to better quality of teaching, and that good research ratings lead to better student recruitment. An important research area is to gather and analyse data on such issues, so as to lead to arguments and advice based on objective evidence. A consequence of such research could be the adaptation of cost allocation mechanisms, so as to steer behaviour towards greater cost-effectiveness.
- (c) Beyond the UK public sector universities, similar research could be conducted in the following contexts:
- UK public-sector FE colleges
 - Non-UK public sector institutions
 - Private educational institutions (UK and elsewhere)

The research questions can be tested in similar ways to this current research, through surveys and interviews, and it is suggested that the 'themes' in this research could provide a suitable framework. In particular, the initial stage of data collection should focus on identifying contextual factors and the desired purposes for an ABC (or allocation) exercise. It is possible that the ideas could be tested also in pre-FE/HE educational establishments, although it would be expected that the context may be so different as to raise wholly different issues (and even 'themes').

- (d) Outside education, there are two particular issues raised in this research that could be pursued further, in terms of the implications for ABC:
- The link of expenditure to income is possible in all contexts, ie. when surplus income is available, then expenditure may increase regardless of activity demands. Expenditure on information technology may for example be a particular area worth investigating, as most organisations (including universities) are presented with expenditure opportunities well beyond funds available, so that a link between income and expenditure is quite plausible. A suitable approach to this research might be either cross-industry or longitudinal studies, especially where there are marked variations in income availability.
 - The maintenance of expenditure levels because of external perceptions is another issue of potentially wider applicability than just universities, although perhaps less so than the income issues above. The research approach could be as for the link to income, albeit with

perhaps less data available. A more feasible approach might be to use case studies in a relatively few organisations, but exploring in depth the motivations for expenditure, for example on 'safety' and 'environmental' issues.

It has been argued (in 5.5.2 (c)) that such situations do not invalidate ABC, but they should be known to the ABC designers, in relation to the likely long-term consequences of the ABC exercise, that is of increased cost-effectiveness and other benefits, but not necessarily cost reduction.

- (e) Finally, behavioural effects are clearly important in both university and other contexts, yet little is known about the relationship between charges/ allocations and behaviour, for example as to the degree of motivation generated. It is not easy to evaluate these relationships in universities for major issues like premises charges, as institutions differ so much in their premises profile and usage, and these major issues are not particularly amenable to experimentation, because of potential dysfunctional results. In addition, contextual factors may mean that charge/ behaviour relationships observed elsewhere cannot be assumed to apply in universities. However, limited exercises might be possible on for example the volume of inter-library loans relative to charges, or the use by schools of central printing services relative to charges. Such exercises could use cross-sector or longitudinal studies, as well as experimentation within individual institutions. Limited exercises of this type might provide some guidance for all institutions on the behavioural aspects investigated, but could also give some indication of the charge/ behaviour relationship to be anticipated in other aspects of university operation. This could be potentially of great value where universities devolve decision making to schools, yet with a need to maintain goal congruence through the allocation mechanisms.

Closing remarks

Activity-based costing (ABC) originally emerged in response to perceived weaknesses in the calculation of product cost in manufacturing, and has since been extended both to a wider context of application and to a more diverse usage.

This current research has continued this extension by taking a more rigorous approach to applicability in the (UK) university context.

This task has been accomplished both in the sense that the ABC knowledge base is now greater, and also in that the research has indicated some further possibilities for extension of the ABC concept.

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Abbreviations and Glossary of Terms

ABC	Activity-Based Costing (ABC) is a cost allocation system that seeks to identify the 'true' cost of products, customers and other cost-objects, by considering the demands on resources made by these cost-objects, on the assumption that these demands will ultimately be reflected in levels of expenditure. The ABC method assesses the demands made on resources by identifying cause-effect relationships between cost objects and the resource-consuming activities that are necessitated by them. A fundamental assumption is that most costs not directly related to short-term changes in product volumes (ie. those considered as fixed costs for short-term planning) are indirectly linked to volumes or other cost-object characteristics in the longer-term, ie. ABC treats these costs as variable. Thus the ethos of ABC can be said to establish true costs of cost-objects in terms of their impact on the long-term costs of the organisation. The practical implementation of ABC treats all costs as variable, and as linked proportionally to the volume of the object or to some other driver of cost, typically the number of transactions being carried out in some business activity. The consequential actions from an ABC exercise can involve decisions related to cost-objects (eg. facilitating product design and pricing decisions), and to decisions related to processes/activities (eg. facilitating cost management or outsourcing decisions). The extension of the original basic ABC concept has led to terms like activity-based management and activity-based budgeting, but in this thesis the term ABC is treated as including such extensions.
Balanced scorecard	A set of indicators (grouped as: financial, customer, internal processes, learning & growth) where high levels are expected to determine long-term profitability.
BES	Business Expansion Scheme
CIPFA	Chartered Institute of Public Finance and Accountancy
CNAA	Council for National Academic Awards
COPOL	Council of Polytechnic Librarians
Course	A learning process undertaken by a student, normally requiring academic staff and premises for its delivery, and often leading to a recognised award or

	qualification. For the purposes of this thesis, this includes the process leading to the award of a degree by research.
CPC	Course Planning Committee
CVCP	Committee of Vice-Chancellors and Principals
Department	An organisational component of a university, classified in this thesis as either an academic department (School) or other department (Service).
Degree	A recognised award for completion of certain courses.
DES	Department of Education and Science
EU	European Union
Faculty	A grouping of similar academic activities and staff, usually corresponding to a grouping of schools. For the purposes of this thesis, 'school' is considered with sufficient generality to include faculty, for the purposes of ABC.
FE	Further Education
FTE	Full Time Equivalent. As an adjective it may refer to student numbers, or to staff numbers. As a noun, it refers to students.
Full cost	Refers to research contracts or courses where no subsidy funding is available, and charges/ fees have to cover all costs.
Functional cost analysis	Functional analysis looks at the functions a product provides to the customer, and for each function compares the cost versus the customer benefit. The same idea has been applied to internal service functions.
GCE	General Certificate of Education
HE	Higher Education
HEI	Higher Education Institution
HEFC	HE Funding Council
HEFCE	HE Funding Council for England
IT	Information Technology
JFC	Joint Funding Councils
LEA	Local Education Authority
Level of learning	The level of learning in a university is most commonly associated with that involved in gaining a first degree or higher degree, but other levels are possible, for example pre-degree foundation studies.
MBA	Master of Business Administration
Mode of learning	A student's mode of learning can be for example: full-time, part-time (where learning is undertaken concurrently with employment or other activities), distance learning (where learning involves little or no attendance at university

	premises), or industrial placement (where, for a limited period within a course, learning is linked to employment experience)
MPhil	Master of Philosophy
MSC	Manpower Services Commission
NAB	National Advisory Body (for HE in the UK)
PCFC	Polytechnics and Colleges Funding Council
PG	Postgraduate
PhD	Doctor of Philosophy
RAE	Research Assessment Exercise
Research	The activity undertaken by academic staff or students to extend the state of knowledge of a subject, with output measured by publications or other forms of dissemination, or by completion of research degrees.
SSR	Staff Student Ratio (Total FTE students/ Total FTE Academic Staff)
School	In this thesis, refers to an academic department, ie. one whose primary purpose is teaching and research.
SCONUL	Standing Conference of National and University Libraries
Service	In this thesis, refers to any department of a university other than Schools, and includes for example Library, Computer Services, Registry, Central management.
Staff	Persons employed by the university. Those whose role is primarily that of teaching and research are termed academic staff; others are in managerial, administrative or support roles.
Student	<i>A person undertaking a learning process, usually registered on a course.</i>
Teaching	The contribution made by academic staff to the learning process, usually through lectures and other interactions with students.
THES	Times Higher Educational Supplement
Top slicing	The deduction made by the university from income before passing the balance on to schools.
UFC	Universities Funding Council
UG	Undergraduate
UK	United Kingdom of Great Britain and Northern Ireland
US	United States of America
Vire	To transfer a surplus from one budget category to another

Appendix 1 - Survey and Interview Notes

Contents of Appendix

Detailed design points for survey

The Institutions covered by the Survey

Cover letter for survey

Survey Questionnaire

Follow-up letter for survey

Thank-you letter for survey

Interview checklist of questions asked

Interview contact sheet (used to summarise responses)

Detailed Design Points for Survey

During the development of the questionnaire, a number of points were designed in, with specific purposes, as below. The reason for each design point is given in brackets. 'R' indicates that the reason was to improve response rate.

Cover letter:

- The letter was addressed to the recipient by name (R)
- Stated who is sending the questionnaire, and the purpose of the survey (R)
- Offered a copy of the analysis (R)
- Included a reply-paid envelope (R)
- Used 'window' envelopes (to save printing address labels)

Questionnaire:

- The name of the respondent and the institution was pre-printed (R) (also to avoid getting questionnaire back without identification)
- Excluded excessive detail in questions on ABC exercise (R) (Not needed for survey objectives)
- Asked open questions on concerns (*To avoid limiting response by presenting a list*)
- Asked about confidentiality needed (R) (*To avoid inadvertent breach of confidentiality*).
- Limited questionnaire to three pages (R)
- Gave a reply date (*To encourage rapid response, and to enable follow up action without causing offence*)

Follow-up letter:

- Same points as original cover letter
- Included another copy of the questionnaire (in case they had discarded/ lost the original)
- Made point that already some data collected (to reinforce the value of their getting a copy of the analysis)

The Institutions covered by the Survey

University of Aberdeen	Anglia Polytechnic University	Aston University
University of Bath	Queen's University of Belfast	Birkbeck College
University of Birmingham	Bournemouth University	University of Bradford
University of Brighton	University of Bristol	Brunel University
University of Cambridge	University College of Cardiff	City University
Coventry University	De Montfort University	University of Derby
University of Dundee	University of Durham	University of East Anglia
University of Edinburgh	U. of Central England at Birmingham	U. of the West of England
University of Essex	University of Exeter	University of Glamorgan
University of Glasgow	Glasgow Caledonian U.	Goldsmiths' College
University of Greenwich	Heriot-Watt University	University of Hertfordshire
University of Huddersfield	University of Hull	University of Humberside
Imperial College	University of Keele	University of Kent
King's College, London	Kingston University	University of Lancaster
U. of Central Lancashire	University of Leeds	Leeds Metropolitan U.
University of Leicester	University of Liverpool	Liverpool John Moores U.
University of London	London Business School	London Guildhall University
University of East London	London School of Economics	University of North London
Loughborough U. of Technology	University of Manchester	Manchester Metropolitan U.
Middlesex University	Napier University	U. of Newcastle-upon-Tyne
U. of Northumbria at Newcastle	University of Nottingham	Nottingham Trent University
Open University	University of Oxford	Oxford Brookes University
University of Paisley	University of Plymouth	University of Portsmouth
Queen Mary and Westfield College	University of Reading	Robert Gordon University
Royal Holloway U. of London	University of Salford	University of Sheffield
Sheffield Hallam University	South Bank University	University of Southampton
University of St Andrews	St David's University College	Staffordshire University
University of Stirling	University of Strathclyde	University of Sunderland
University of Surrey	University of Sussex	U. College of Swansea
University of Teesside	Thames Valley University	University of Ulster
UMDS of Guy's & St Thomas's Hospitals		UMIST
University College London	U. College of North Wales	U. College of Wales Aberystwyth
U. of Wales College of Medicine	University of Warwick	University of Westminster
University of Wolverhampton	University of York	

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Head of School: Professor Mary Benwell
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19 October 1994

Dear Mr Gilbert,

Activity Based Costing - Survey of UK University Experience

In the past few years, the cost allocation method "Activity-Based Costing" (ABC) has received wide coverage in terms of success stories in manufacturing, service industries and the public sector. However, there has been relatively little published information about experiences in Higher Education.

I am carrying out research, towards a PhD, as to the relevance of ABC within universities. As part of this research I am conducting a brief survey of UK experience, by means of a postal questionnaire. I would be very grateful for your assistance in this.

The enclosed questionnaire has been kept to a minimum to reduce the time needed for completion. All the same, the summarised results should be of interest to you, and will be sent to you following analysis. Details of individual responses will be kept confidential if required. A reply-paid envelope is enclosed.

I look forward to your response,

Yours sincerely,

Mike Mitchell
Senior Lecturer

Phone: (01865) 485972 (direct)
Email: mmitchell@brookes.ac.uk

Activity-Based Costing in Universities

Survey October 1994

Please return the completed questionnaire by Friday 4 November 1994, to:
Mike Mitchell, Oxford Brookes University, School of Business, Wheatley, Oxford, OX33 1PS

Institution: _____

Respondent (Name, position) _____
(please amend if necessary)

May your institution be named in connection with your response
in my thesis? _____ in published material? _____

Has the institution carried out some form of ABC exercise? (Y/N) ☐

If **No**, complete Section 1 (below) only

If **Yes**, go to Section 2 on the next page

Section 1 (complete this if your institution **has not** carried out an ABC exercise)

Do you use any form of central cost allocation to academic departments? (Y/N) ☐

Have you considered using ABC methods? (Y/N) ☐

What are your views about the applicability and value of these methods in your university?

(continue on reverse of page if necessary)

What is the single most important factor which might prevent the use of these methods in your university?

If you have completed Section 1, no further responses are required.

Section 2 (complete this if your institution **has** carried out an ABC exercise)

What were the objectives of the ABC exercise?

Was it a one-off exercise, or is it a regular/annual exercise?

In allocating central costs (Library, Registry, etc.) what cost drivers were identified as being linked to activity levels? (eg. Number of students, number of staff, number of admissions)

Were there any elements of central cost for which no suitable driver could be identified (ie. fixed or 'core' costs)?

Was the allocation of central costs only to academic departments and faculties, or was it down to course and programme level?

please continue onto the next page

Section 2 (continued)

Did the ABC exercise also extend to the allocation of academic department costs (eg. Faculty management, Academic staff)?

What cost drivers were used for the allocations of these academic costs?

Were there any fixed or 'core' elements of these academic costs for which no suitable driver could be identified?

For the Institution as a whole, did the ABC exercise prove worthwhile? What were the benefits?

What were the problems?

What are your overall views and conclusions about the applicability and value of the ABC approach in your university?

(continue on reverse of page if necessary)

Any other comments? _____

That is the end of section 2. Thank you for your assistance.

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15 November 1994

Dear Mr Gilbert,

Activity Based Costing - Survey of UK University Experience

You may recall that I wrote to you recently, asking for your assistance in a survey of UK university experience with Activity-Based Costing (ABC).

I am carrying out research, towards a PhD, as to the relevance of ABC within universities.

I don't yet seem to have a response from you, and am enclosing a duplicate questionnaire in case the first was mislaid. There are already sufficient responses to permit analysis, however, the greater the response rate, the more useful and comprehensive the analysis will be. A copy of the summarised results will be sent to each respondent.

I look forward to your response,

Yours sincerely,

Phone: (01865) 485972 (direct)
Email: mmitchell@brookes.ac.uk

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Head of School: Professor Mary Benwell
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Activity Based Costing - Survey of UK University Experience

In the Autumn of 1994, you gave me your assistance in a survey of UK university experience with Activity-Based Costing (ABC), as part of my PhD research.

It took longer than I expected to analyse the responses, not least because of work pressures. However, I have now completed this analysis, which is published this month in Public Money and Management. I enclose a photocopy for your information.

Thank you for your help in this. I hope that you will find the survey results of use and my discussion of interest also.

Yours sincerely,

Phone: (01865) 485972 (direct)
Email: mmitchell@brookes.ac.uk

Mike Mitchell
Senior Lecturer

Interview checklist, following survey of universities

Name of interviewee _____ Institution _____

Position _____ Date of Interview _____

1. The 'Black Box' View of Schools

In most of the responses to my survey, it seems that finance officers take a 'black box' view of schools. The expenditure budgets and revenue targets are set after perhaps considerable analysis, but central finance does not concern itself with certain details within schools (eg. alternative costings of new courses, based on different approaches and on different assumptions).

Q. Why do you think finance officers prefer this 'black box' approach?

Probe: is this common practice
in the public sector?

CIPFA influence?

Probe: how are Schools
encouraged to seek
more efficient approaches?
eg. SSR?

2. The Costs of Central Services and Management

In most of the responses to my survey, it seems that finance officers do not see allocation systems as a tool to help manage central costs. These questions are to help in my understanding of these issues.

Q. In your institution, in setting budgets for central services like the library, is there a mechanism to take account of changing demands? (eg. number of students, or number of postgraduates?)

If yes... *probe*:
proportional?
economies of scale?

Q. In your institution, how are central services encouraged towards greater efficiency? (eg. library, finance, registry, personnel)

probe: service level
agreements?

Q. Most respondents saw the costs of central management as fixed, rather than linked to any 'driver'. In your institution, do you think there is any link between central management costs and drivers like: number of students, number of staff, number of courses?

if yes.. *probe*:
relationship?
proportional?
linear?

probe: what about
expenditures on
marketing?

3. Academic Staff Costs and Premises Costs

The largest cost elements in most universities are academic staff and premises, yet these both seem to be problematic to allocate to teaching and other activities.

Q. Many institutions allocate academic staffing as establishment headcount rather than as expenditure budgets. Why do you think this is?

Q. Many institutions allocate premises as space allocations rather than as expenditure budgets. Why do you think this is?

Q. Do you think that the scale of these costs is so large that sophisticated allocation of other costs appears to most finance officers as a relatively low priority?

Q. Premises often seem to be a scarce resource, yet there seems little interest generally in opportunity or market costing. Do you know why this might be?

Q. In your own institution, how are Schools encouraged to make efficient usage of premises?

Interview Contact Sheet

ID _____ Person _____ Date _____

Position _____ Institution _____

Type of Institution _____ ABC user? (survey) _____

Summary of Information Gained (or not) on Target Questions

1. Why do Finance Officers prefer
the black box approach?

2. Central Services

- * Mechanism to vary budgets?

- * How is efficiency encouraged?

- * Central mgt - fixed or drivers?

3. Academic staff & Premises

- * Why alloc. staff as headcount?

- * Why alloc. premises as space?

- * Scale deters detail allocn. on other costs?

- * Premises: why no opp/mkt costing?

- * Premises: how to encourage efficiency?

Anything else that was interesting/ illuminating/ important?

Relates to which themes?

Appendix 2 - Statistical Analysis of Library Costs

Contents of Appendix

Institutions included in the statistical analysis

Detailed notes on the statistical analysis

Institutions included in the statistical analysis

SCONUL data (The 'old' universities)

Aberystwyth
Bath
Birmingham
Brunel
City
Essex
Glasgow
Heriot-Watt
Hull
Keele
Kent
Lancaster
Leeds
Leicester
Loughborough
Newcastle
QMW
RHBNC
St Andrews
Salford
Sheffield
Southampton
Stirling
Strathclyde
Surrey
Sussex
Swansea
Univ. College
UMIST
York

COPOL data (The 'new' universities) (mostly Polytechnics at the time of analysis)

Bolton
Bournemouth
Brighton
Coventry
De Montfort
Derby
East London
Glamorgan
Glasgow Cal
Hertfordshire
Huddersfield
Humberside
Kingston
Leeds Met
Liv John Moores
London Guildhall
Manchester Met
Middlesex
Napier
Nene
North London
Northumbria
Nott Trent
Oxford Brookes
Plymouth
Portsmouth
Robt Gordon
Staffs
Teesside
Thames Valley
West of England
Wolverhampton

Detailed notes on the statistical analysis

1 COPOL 1991/92 Data

1.1 Initial analysis to finalise the data set

The initial regression, of TE on all seven potential drivers, and using all 32 institutions, produced a set of residual errors that were plotted against each independent variable. There were two concerns about these results in terms of leverage (large values of independent variables), but no obvious concerns in terms of influence (large residual errors). The leverage concerns were:

Variable EB: three large values (Coventry, Brighton, Northumbria)

Variables OE and PG: Large value for Manchester Metropolitan

The regression was therefore repeated, to exclude these four institutions. The effect was to make a dramatic change in the p-value of the coefficient of EB, increasing it from an apparently significant 0.017 to a non-significant 0.641. Similarly the correlations of EB changed markedly, for example with TE (from 0.33 to -0.11). Without the leverage effect of the four institutions, it was clear that EB had no obvious part of the relationships under consideration, for the majority of institutions, so EB was excluded from further consideration.

The full regression (32 observations) was now repeated without variable EB, and the residual plots were again reviewed. The only remaining concern was with one institution, Manchester Metropolitan, which potentially was applying leverage to OE and PG, and to some extent FTE and GF also. The regression was repeated without Manchester to test the effect of this leverage. The impact of this change on the coefficients was substantial (eg. for PG from 19.2 to 34.2); there was also an effect on the p-values (eg. for UG from .38 to .46). As a further check, correlations were recalculated without Manchester, and in fact many correlations were reduced (eg. UG/OE from 0.58 to 0.47).

Although it appeared that Manchester should be removed because of its leverage, there was of course a risk of continually finding reasons to exclude individual institutions, ending up with little or no data. Therefore, as a comparison, the correlations were repeated but excluding Northumbria (the next likely candidate for exclusion) rather than Manchester. In this case the change in correlations was much smaller (eg. UG/OE from 0.58 to 0.57), therefore it gave some support for the view that Manchester was indeed a special case. While there is no 'correct' answer to all this, on the basis of

this evidence, it was considered justifiable to exclude Manchester Metropolitan from the data-set for all further analysis.

1.2 Testing for non-proportionality of TE v. FTE

Care was needed in examining the p-value for a constant term, as it can sometimes be altered simply by redefining the variables. Altering the zero on the measurement scale (but not the scaling itself) would have this effect, for example (in the physical sciences) measuring temperature in Fahrenheit or Absolute rather than Celsius. Re-scaling a variable (eg. using an hours or modules equivalent of FTE) would not have this effect, but it would indirectly cause a change if for example FTE^2 were included as in regression R04. However, if attention is restricted to regressions R02 and R03, the variable FTE is itself stable in terms of its definition, so there was some reassurance from the reasonably low value for the p-value of the constant term in regression R03, ie. giving support to the case that there really was a constant term that had not arisen spuriously from the sampling process.

1.3 Finding the 'best' regression

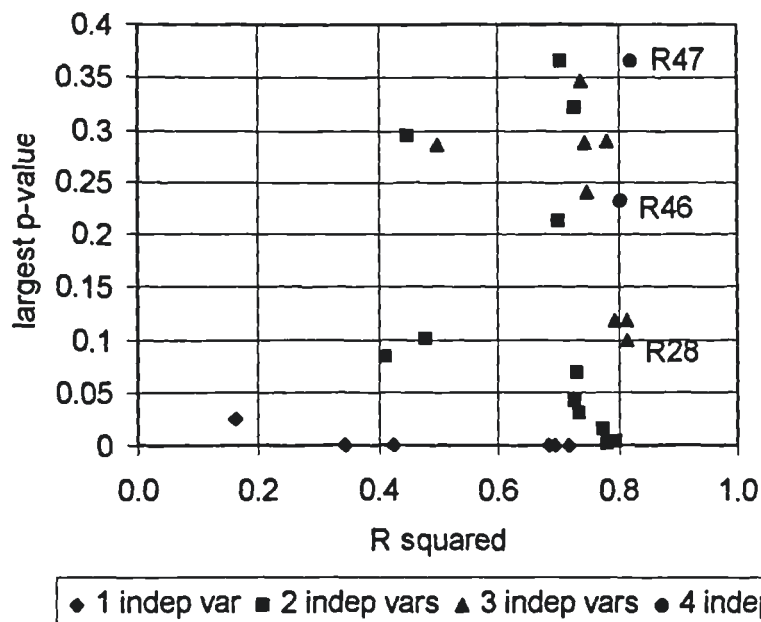
The chosen approach to filtering from the 63 regressions was to explain the largest part of the variation (R^2) with the smallest number of independent variables (i.v.), provided there was reasonable evidence for the inclusion of each variable. The initial step in the filtering was to eliminate all regressions which included a p-value greater than 0.4. The use of p-value as a criterion was considered justifiable in that a large value indicated that there was no substantive evidence for the inclusion of the associated variable. The threshold of 0.4 was chosen to eliminate approximately half of the regressions, ie. a fairly cautious first step. The results of the 28 remaining regressions are shown in table A2.1.

Table A2.1 COPOL 91-92: Summary of regressions where the largest p-value is less than 0.4

No. of Indep Variables	Regn Ref	R squared	Adjusted R squared	Standard Error	Largest p-value of coeff't	Indep Variables					
						GF	FTE	OE	AC	UG	PG
1	R05	0.718	0.709	221,861	2E-9	1					
	R03	0.695	0.684	230,881	6E-9		1				
	R09	0.683	0.672	235,315	1E-8			1			
	R06	0.424	0.405	317,118	7E-5				1		
	R08	0.342	0.320	338,969	0.001					1	
	R07	0.163	0.134	382,414	0.024						1
2	R18	0.795	0.781	192,440	0.003	1		1			
	R14	0.780	0.764	199,740	0.003		1	1			
	R10	0.773	0.757	202,557	0.015	1	1				
	R24	0.733	0.714	219,815	0.030			1		1	
	R13	0.730	0.710	221,196	0.068		1			1	
	R16	0.728	0.709	221,806	0.322	1					1
	R21	0.727	0.708	222,235	0.043			1	1		
	R12	0.704	0.683	231,490	0.365		1				1
	R23	0.700	0.679	232,807	0.212			1			1
	R20	0.478	0.441	307,359	0.101				1	1	
	R19	0.447	0.407	316,354	0.295				1		1
	R22	0.410	0.368	326,680	0.083					1	1
3	R28	0.815	0.795	186,212	0.100	1	1	1			
	R36	0.813	0.793	187,170	0.119	1		1	1		
	R27	0.793	0.770	196,990	0.118	1	1			1	
	R25	0.783	0.758	201,969	0.290	1	1		1		
	R44	0.747	0.718	218,087	0.240			1	1	1	
	R41	0.744	0.716	219,128	0.288			1		1	1
	R30	0.738	0.709	221,534	0.347		1		1	1	
	R39	0.500	0.444	306,359	0.286				1	1	1
4	R47	0.821	0.793	186,750	0.367	1	1	1	1		
	R46	0.804	0.774	195,213	0.233	1	1		1	1	

The next step in the process was to identify and eliminate any regression which was clearly inferior to another. Graphically, figure A2.1 shows the spread of results for R^2 and largest p-value; the goal was to select regressions towards the bottom right boundary of the results.

Figure A2.1 COPOL 91/92 Regressions



Examining the diagram, it can be seen that for all results where R^2 is less than 0.6, there are clearly superior regressions with the same number of i.v., but with larger R^2 . Similarly, in considering the results where the number of i.v. is 2 or 3, those regressions with p-values greater than 0.2 are clearly inferior to others with higher R^2 and lower p-value. In considering the results for 4 i.v., regression R46 is clearly inferior to regression R28 (with 3 i.v.); the R^2 value for regression R47 is (inevitably) greater than that for R28, but its adjusted value is poorer, as is its standard error. In addition, the p-value is high compared to the remaining regressions. Finally, for regressions with 2 i.v., there were three results with R^2 less than 0.74; these were clearly inferior to the remainder (with R^2 greater than 0.77). All these regressions were discarded, and the remaining results were as follows:

No. of Indep. Variables	Regn Ref	R^2	Adjusted R^2	Standard Error	Largest p-value of coeff't	Independent Variables
1	R05	0.718	0.709	221,861	2E-9	GF
	R03	0.695	0.684	230,881	6E-9	FTE
	R09	0.683	0.672	235,315	1E-8	OE
2	R18	0.795	0.781	192,440	0.003	GF, OE
	R14	0.780	0.764	199,740	0.003	FTE, OE
	R10	0.773	0.757	202,557	0.015	GF, FTE
3	R28	0.815	0.795	186,212	0.100	GF, FTE, OE
	R36	0.813	0.793	187,170	0.119	GF, OE, AC
	R27	0.793	0.770	196,990	0.118	GF, FTE, UG

Regressions R28 and R36 were both superior in terms of R^2 and adjusted R^2 to all regressions of 1 or 2 i.v., and had acceptable (if not ideal) values for the maximum of their p-values. R28 appeared however to be the 'best' choice, given that its R^2 and p-value were slightly better than R36, and it also contained the same variables that appear in every set of 1 or 2 i.v. in the final list of regressions above. The full results for this selected 'best' regression were as follows:

Regn Ref	Dep Var.	Indep Var	Estimated Coefficient	p-value	R^2	Adjusted R^2	Std. error of estimate
R28	TE	Constant	132471	0.298	0.815	0.795	186,212
		GF	0.01517	0.030			
		FTE	44.39	0.100			
		OE	553.2	0.020			

Thus the selected equation was :

$$\begin{aligned} \text{Total Expenditure} = & 132,471 + 44.39 \times \text{Number of FTE's} \\ & + 0.01517 \times \text{Institutional Income (Grants \& Fees)} \\ & + 553.2 \times \text{Number of Other Employees (Non-academic)} \end{aligned}$$

Although each i.v. was statistically significant, it was interesting to ask whether each was also important in terms of the magnitude of its contribution to the final estimate. For a typical university, with say 8000 FTE students, £30 million income, and 800 non-academic employees, the equation would give an estimate made up of approximately these figures:

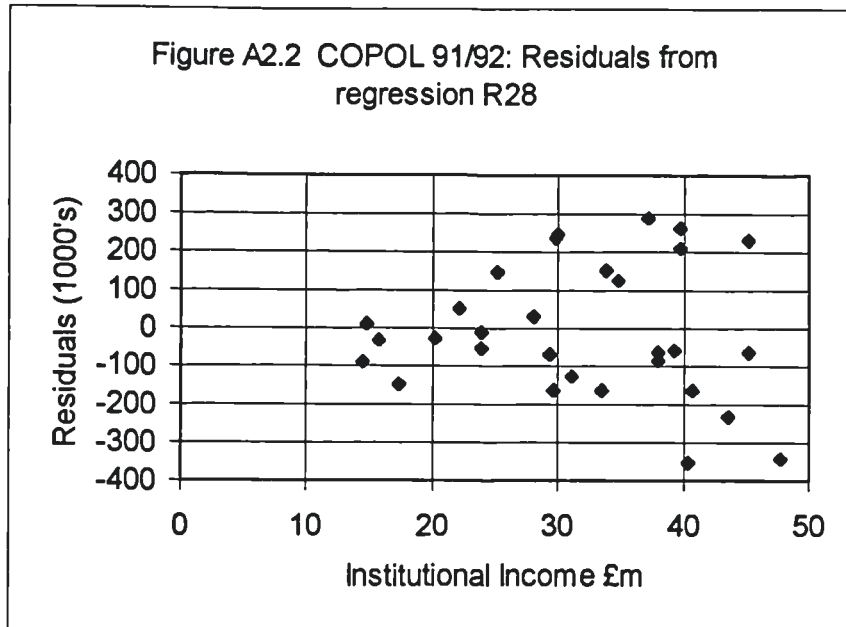
Constant 132, FTE's 355, Income 455, and Employees 443 (all in thousands of £)

Thus, each of the independent variables did make a substantive contribution to the estimate.

The residuals for this regression, when plotted, showed slight signs of non-linearity, in particular against Institutional Income (Figure A2.2). A further regression to test this possibility (using the square of this variable) gave a slight increase in adjusted R^2 (from 0.795 to 0.799) but with a p-value for the new coefficient of 0.224. Although this was not considered sufficient evidence to include this new variable, it does lend some support for the possibility of non-linearity, and for economies of scale (the coefficient was negative). In the absence of a non-linear term in the equation, it adds credibility to the inclusion of a constant term in the equation, as a means of approximating a non-linear relationship over a limited range of the independent variable.

In fact, more apparent than non-linearity was the larger size of residual errors for larger universities. While this does not invalidate the least squares regression method (mathematically), it does mean

that larger universities have a stronger effect than might be desired. If a model is preferred that recognises that residual errors are perhaps proportional rather than additive, and that seeks to minimise these proportional errors, then it is necessary to transform the original variables prior to regression calculations.



A convenient set of transformations was to divide all variables by a common measure of scale, and for this purpose, FTE was perhaps most appropriate, given that some of the resulting transformed variables are in fact used commonly for comparative purposes. Thus the equation:

$$TE = 132,471 + 44.39 \times FTE + 0.01517 \times GF + 553.2 \times OE$$

would be represented instead as:

$$TE/FTE = 132,471 / FTE + 44.39 + 0.01517 \times GF / FTE + 553.2 \times OE / FTE$$

The transformations used were thus:

Dependent variable: TEF (= TE / FTE)

Independent variables: CKF (= 100000 / FTE); GFF (= GF / FTE); OEF (= OE / FTE);
UGF (= UG / FTE); PGF (= PG / FTE); ACF (= AC / FTE);

All regressions included a constant term, which was equivalent to the inclusion of the FTE variable in the non-transformed regressions.

The first step was to examine correlations for these transformed variables. The largest correlations with TEF were, as expected, GFF 0.610 and OEF 0.553. The largest cross-correlations amongst the independent variables were 0.459 and 0.391, so that for these transformed variables it was considered acceptable to use the backwards elimination step-wise approach for selecting the 'best'

regression. The best such regression corresponded with the model derived from non-transformed data, results as follows:

Regn Ref	Dep Var.	Indep Var	Estimated Coefficient	p-value	R ²	Adjusted R ²	Std. error of estimate
R73	TEF	Constant	49.28	0.039	0.509	0.455	20.24
		CKF	0.9202	0.289			
		OEF	456.9	0.022			
		GFF	0.01740	0.005			

This gave a model, in un-transformed terms of:

$$\begin{aligned} \text{Total Expenditure} = & 92,017 + 49.28 \times \text{Number of FTE's} \\ & + 0.01740 \times \text{Institutional Income (Grants \& Fees)} \\ & + 456.9 \times \text{Number of Other Employees (Non-academic)} \end{aligned}$$

The model is similar to that previously identified, but of course is optimised to reduce variation in the estimate of the measure of expenditure per FTE student. The p-value for CKF (corresponding to the constant term in the regression on the original data) was not entirely satisfactory, but dropping it caused a decrease in R² to 0.488 and adjusted R² to 0.452, so the variable was retained.

The strongest variable in these latter regressions (in terms of p-value) was consistently GFF, so for completeness, a scatter diagram of TEF against this variable was plotted (figure 4.2 in main text) and a regression was carried out, results as follows:

Regn Ref	Dep Var.	Indep Var	Estimated Coefficient	p-value	R ²	Adjusted R ²	Std. error of estimate
R75	TEF	Constant	77.98	0.001	0.372	0.350	22.11
		GFF	0.02354	0.0003			

Both the diagram and the regression results (ie. the p-value of GFF) indicated an extremely strong relationship between expenditures per FTE and institutional income per FTE.

2 SCONUL 1991/92 Data

2.1 Initial analysis to finalise the data set

As with the COPOL data, the 1991-92 SCONUL data-set had already been reduced to eliminate institutions that would clearly exert excessive leverage due to extremely large or small values of the variables, but again the first step taken was to check that the data-set should not be refined further, by means of a regression on all the independent variables. An examination of the residual plots showed no evidence of influence, but there was a strong suggestion of leverage for variable EB (external borrowers). To test the effect of this leverage, the regression was repeated without the three institutions with largest values of EB. This did indeed make a substantial difference to the regression results. As EB has a very skewed distribution (mostly small values, but with a long 'tail' of higher values), the problem was unlikely to be resolved by dropping institutions. As EB in any case had (in the regression on the full data-set) a very poor p-value (0.935), (and in fact a small negative coefficient) it was considered reasonable to exclude EB from all further regressions on this data.

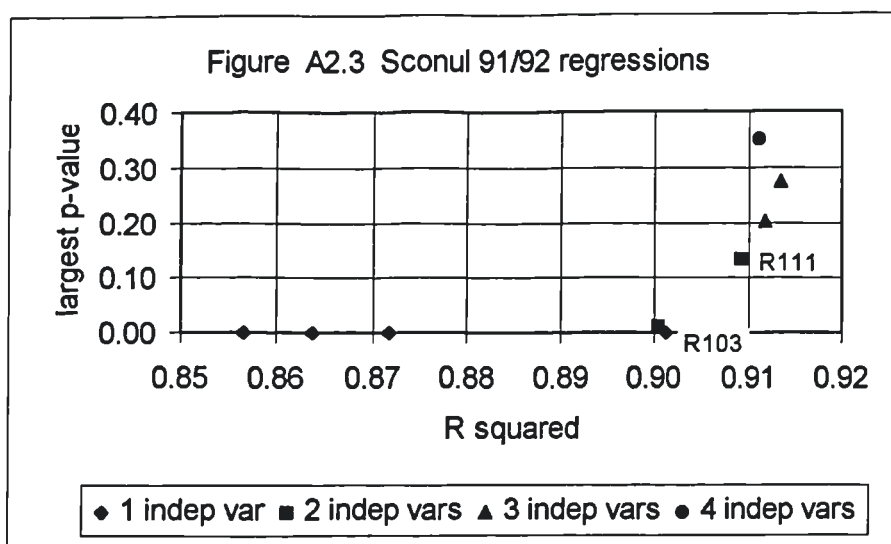
2.2 Finding the 'best' regression

Regressions were carried out, to cover all combinations of driver variables (all regressions included a constant term). The first filtering of these regression results was to exclude all where the largest p-value exceeded 0.402 (The threshold was raised slightly from 0.4 so as to include for comparison the 'best' COPOL regression (on GF, FTE, and OE). The remaining regressions are given in table A2.2. To filter the results further, the following results were excluded: for 1 Independent variable (i.v.): $R^2 < 0.85$; for 2 i.v.: $R^2 < 0.9$ or $p > 0.2$; for 3 i.v.: $R^2 < 0.907$ or $p > 0.3$. The remaining results were as follows, and are plotted in figure A2.3.

No. of Indep Variables	Regn Ref	R^2	Adjusted R^2	Standard Error	Largest p-value of coeff't	Independent Variables
1	R103	0.901	0.898	294,759	1E-15	FTE
	R108	0.872	0.867	335,882	5E-14	UG
	R106	0.864	0.859	346,092	1E-13	AC
	R105	0.857	0.851	355,100	2E-13	GF
2	R111	0.909	0.903	287,652	0.133	FTE, AC
	R117	0.900	0.893	301,413	0.010	GF, UG
3	R131	0.913	0.903	286,296	0.273	FTE, OE, AC
	R126	0.912	0.902	288,958	0.200	GF, FTE, PG
4	R150	0.911	0.897	295,803	0.349	GF, FTE, UG, OE

Table A2.2 SCONUL 91/92: Summary of regressions where the largest p-value is less than 0.402

No. of Indep Variables	Regn Ref	R squared	Adjusted R squared	Standard Error	Largest p-value of coeff't	Indep Variables					
						GF	FTE	OE	AC	UG	PG
1	R103	0.901	0.898	294,759	1E-15		1				
	R108	0.872	0.867	335,882	5E-14					1	
	R106	0.864	0.859	346,092	1E-13				1		
	R105	0.857	0.851	355,100	2E-13	1					
	R109	0.723	0.713	493,237	3E-09			1			
	R107	0.513	0.496	654,166	8E-06						1
2	R111	0.909	0.903	287,652	0.133		1		1		
	R112	0.906	0.899	292,816	0.252		1				1
	R114	0.905	0.898	293,789	0.286		1	1			
	R110	0.905	0.898	294,941	0.335	1	1				
	R117	0.900	0.893	301,413	0.010	1				1	
	R120	0.895	0.887	309,429	0.021				1	1	
	R124	0.890	0.881	317,415	0.047			1		1	
	R121	0.889	0.880	318,649	0.021			1	1		
	R122	0.882	0.873	328,234	0.139					1	1
	R118	0.874	0.864	339,380	0.067	1		1			
	R115	0.873	0.864	339,694	0.162	1			1		
	R123	0.778	0.761	450,237	0.016			1			1
3	R131	0.913	0.903	286,296	0.273		1	1	1		
	R129	0.913	0.903	287,400	0.316		1		1		1
	R126	0.912	0.902	288,958	0.200	1	1				1
	R133	0.909	0.898	294,041	0.387		1	1			1
	R127	0.908	0.897	295,763	0.365	1	1			1	
	R128	0.908	0.897	295,288	0.402	1	1	1			
	R143	0.906	0.896	297,597	0.204	1		1		1	
	R144	0.906	0.896	297,844	0.088			1	1	1	
	R141	0.896	0.884	313,238	0.201			1		1	1
4	R150	0.911	0.897	295,803	0.349	1	1	1		1	



Clearly, unlike the COPOL data, one could argue that the 'best' regression (R103) was of just one variable (FTE) in that adjusted R^2 is little short of the best attainable, and of course minimises the number of explanatory variables. Perhaps a reasonable case can however be made for regression R111, using FTE and AC, in that the best adjusted R^2 is attained, with a reasonable size for p-value (0.133). Given the lack of improvement in adjusted R^2 and the higher levels of p-value, the regressions on three and four variables were not considered superior to the latter regression. Regression R103 was therefore the strongest candidate for SCONUL, with a caveat that regression R111 came a 'good second'. Results for both regressions are as follows:

Regn Ref	Dep Var.	Indep Var	Estimated Coefficient	p-value	R^2	Adjusted R^2	Std. error of estimate
R103	TE	Constant	-29,675	0.832	0.901	0.898	294,759
		FTE	298.1	1E-15			
R111	TE	Constant	105,095	0.519	0.909	0.903	287,652
		FTE	213.0	0.001			
		AC	522.4	0.133			

The residual plots were examined for these regressions, and in neither case was there evidence of influence or leverage, or indeed of non-linearity. An important difference between these SCONUL results (R103) and the COPOL results (R03) was the constant term in the regression on FTE. For COPOL, the p-value of the constant was 0.121 whereas for SCONUL is was 0.832; for SCONUL the standard error of the constant coefficient was more than four times larger than the coefficient itself. A similar (albeit less dramatic) statement could be made also about regression R111. The regressions were therefore repeated to test the effect of dropping the constant term, with results as

follows:

Regn Ref	Dep Var.	Indep Var	Estimated Coefficient	p-value	R ²	Adjusted R ²	Std. error of estimate
R103a	TE	FTE	294.4	2E-27	0.901	0.901	289,869
R111a	TE	FTE AC	241.6 403.5	5E-07 0.162	0.908	0.905	284,689

Given the improvement in adjusted R² and in standard error, it was considered that there was no supporting evidence for the inclusion of a constant term. The final selection of a 'best' equation for SCONUL was thus regression R103a, ie.:

$$\text{Total Expenditure} = 294.4 \times \text{Number of FTE's}$$

Regression R111a was perhaps still the best second choice, however the largest p-value had deteriorated to 0.162, which was bordering on what was considered unacceptable in these analyses.

To gain further insight into the relationships, and conscious of the possibility that residual errors may have been proportional rather than absolute, the same set of transformations as for COPOL were made, for further analysis. As before, the dependent variable became TEF (=TE/TEF), ie. the total expenditure per FTE student, and the independent variables were CKF (= 100000 / FTE); GFF (= GF / FTE); OEF (= OE / FTE); UGF (= UG / FTE); PGF (= PG / FTE); ACF (= AC / FTE). Cross-correlations were calculated, and as for COPOL these were not particularly large (the largest being 0.614), thus indicating the possibility of using backwards elimination in the regressions. In fact the full regression on all independent (transformed) variables gave an R² of only 0.081. This is an important result, in that no subset of variables can produce a larger result, ie. no regression can explain more than about 8% of the total variation in expenditure per FTE. (This contrasted strongly with the COPOL data, where an R² of 0.372 was obtained from just one variable, GFF). Perhaps not surprisingly, the backwards elimination process led to a regression on just one variable (PGF) with a poor p-value (0.22) an R² of only 5%, and a standard error (47.4) little better than the standard deviation of the dependent variable (45.2). As a final check, a regression was carried out on ACF, corresponding to the 'second choice' regression for the original SCONUL data. The result was an R² of only 0.027 (and an adjusted R² that was negative!), as well as a p-value of 0.387.

The conclusion was that the variable TEF (total expenditure per FTE) was adequately estimated by its sample mean (292.2), and as a corollary that the regression (R103a) on the original data, using

FTE as the predictor, and containing no constant term, was confirmed as the 'best' for the SCONUL data.

3 1994/95 Data

3.1 COPOL

In assessing which was the 'best' regression, all the following regressions appeared to be reasonable contenders, including R183, which corresponds to the best 1991/92 regression.

Regn Ref	Dep Var.	Indep Var	Estimated Coefficient	p-value	R ²	Adjusted R ²	Std. error of estimate
R186	TE	Constant	181617	0.467	0.771	0.751	295790
		FTE	138.4	2.7E-05			
		PG	216.6	0.055			
R184	TE	Constant	217017	0.393	0.767	0.747	298395
		FTE	125.3	0.001			
		OE	541.5	0.070			
R183	TE	Constant	231588	0.361	0.780	0.750	296763
		FTE	97.2	0.026			
		OE	474.4	0.116			
		GF	0.00744	0.275			

In these regressions, it was less obvious that a constant term was significant. In fact a regression on FTE with a constant term produced a poor p-value for the constant (0.530), and an adjusted R² that was inferior to a regression without a constant.

As before a set of regressions was also performed on the transformed variables TEF (Total expenditure per FTE), etc. Backwards elimination led to a regression on PGF (Postgraduate students per FTE), GFF (grants and fees per FTE), and CKF (100000/FTE, corresponding to a constant term in the original regressions). This and the similar regression excluding GFF are as follows:

Regn Ref	Dep Var.	Indep Var	Estimated Coefficient	p-value	R ²	Adjusted R ²	Std. error of estimate
R192	TEF	Constant	77.28	0.055	0.338	0.248	24.55
		CKF	4.654	0.022			
		PGF	172.7	0.127			
		GFF	0.00995	0.184			
R193	TEF	Constant	118.4	5E-05	0.282	0.219	25.01
		CKF	3.983	0.043			
		PGF	223.1	0.043			

One could argue for the latter of these on the basis of the relatively poor p-value of GFF in the former, but the former regression does perhaps have greater merit due to the improved adjusted R². Summarising all the COPOL 1994/95 results, it might reasonably be said that while GF is still relevant as a predictor, its effect seems to have lessened since 1992, while the effect of PG seems to have strengthened. The existence of a constant term, while not particularly apparent in the raw data, is strongly evidenced (by the variable CKF) in the transformed data, so again, it might be concluded that while there is still evidence for a constant term (and economies of scale), it is less pronounced than in 1992.

It is not easy in these circumstances to select a 'best' regression, but if the regressions on transformed data are taken into account, the choice is probably R186, ie. the regression (with a constant term) on FTE and PG. However it is fair to say that variables OE and GF still have some predictive power, although less clearly than in 1991/92.

3.2 SCONUL

A full regression on all the independent variables gave a set of residual plots which was generally acceptable. However, Birmingham university had a large residual, and also because of its size (the largest library expenditure) was potentially influencing the regressions unduly. In fact, examining the original data, and comparing Birmingham with the next largest institution Leeds (in terms of library expenditure), Birmingham had lower values of all independent variables except PG.

Therefore the regression was tested without Birmingham. This improved the values of R², adjusted R² and standard error (reducing the latter from 403,012 to 333,601) -- also some p-values and coefficients were substantially changed (eg. for GF from 0.957 to 0.350). Thus it was considered unsatisfactory to retain Birmingham as this single observation was evidently influencing results

substantially; Birmingham was dropped from the data set for the remainder of the analysis.

As with the 1991/92 data, there was no evidence of a constant term in the regressions, or of non-linearity. In comparing the regressions, the 'best' regression could be argued to have been on UG and AC, but almost as good was the regression on FTE and AC. The results for these regressions, and that on FTE alone (ie. the best 1991/92 regression)(with and without a constant term) were as follows:

Regn Ref	Dep Var.	Indep Var	Estimated Coefficient	p-value	R ²	Adjusted R ²	Std. error of estimate
R206a	TE	AC UG	677.6 268.8	3E-04 4E-11	0.938	0.935	313177
R208a	TE	AC FTE	648.9 220.9	0.002 7E-10	0.922	0.919	349751
R207a	TE	FTE	298.5	4E-25	0.889	0.889	410384
R207	TE	Constant FTE	-66989 305.1	0.730 2E-14	0.889	0.885	416979

As with previous data sets, the variables were transformed (to TEF = total expenditure per FTE, etc.) and regressions repeated. Birmingham was excluded, as were three other institutions (UCL, Salford and City) because of excessive leverage in the transformed data. Backwards elimination led to a regression on ACF (Academic staff per FTE) but with a significance level of only 10%. This is not a strong effect, and the standard error of estimate 43.4 was barely an improvement on the standard deviation of the dependent variable 45.0. All the same, in reviewing all the results for SCONUL in 1994/95 it would be fair to say that although expenditure seems largely dependent on FTE (or UG, which is closely correlated with it) there are perhaps indications that some of the variability can now be more readily identified with variability in other variables, than in 1991/92.

Appendix 3 - Relevant publications by the author

Contents of Appendix

Mitchell, M.S. and Wycherley, I., 1994.
ABC from First Principles.
Management Accounting (UK) June p.52-53.

This article describes an ABC implementation at a publishing company.

The contribution by the author was the fieldwork conducted while employed by the publishing company, and the description of that work. The co-author contributed the commentary.

Howson, J. and Mitchell, M.S., 1995.
Course costing in devolved institutions: perspectives from an academic department.
Higher Education Review 27 (2) Spring p.64-8.

This article considers the school versus institutional view of costs.

The contribution by the author was the initial development of the ideas, and the initial drafting of the article. The co-author reviewed and helped redraft prior to publication.

Mitchell, M.S., 1996.
Activity-Based Costing in UK Universities.
Public Money & Management 16 (1) Jan-Mar p.51-7.

This article describes the survey conducted as part of this research, and comments on the findings.

Mitchell, M.S., 1997.
Cost/Driver Relationships in Activity-Based Costing.
Journal of Applied Accounting Research 3 (3) Apr p.124-43.

This article describes the statistical analysis performed on library costs, and comments on the findings.

SOME PARTS
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